

Plane Geometry

VIDEO MANUAL



A Beka
Academy

VIDEO PROGRAM

Plane Geometry

VIDEO MANUAL

Two Semesters

Textbooks & Materials

Student Materials

1. Texts
 - 95370 • *Plane Geometry*
 - 67075 • *Plane Geometry Practice Exercises*
2. Tests / Quizzes
 - 178101 • *Plane Geometry Tests / Quizzes*
3. Supplies (may be purchased from a local vendor)
 - Assignment notebook
 - Notebook paper
 - Loose-leaf notebook with 7 dividers
 - Protractor
 - Compass
 - Ruler

Teacher Materials

1. Teacher Keys
 - 95397 • *Plane Geometry Solution Key*
 - 178098 • *Teacher Key to Plane Geometry Tests / Quizzes*
2. Optional (may be purchased from *A Beka Book*)
 - 95370 • *Plane Geometry*

Plane Geometry Video Manual

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VIDEO TEACHER

Mr. Eric Collins

- B.S., Mathematics Education
M.S., Education Administration
- 20 years teaching experience

Introduction

The purpose of this course in plane geometry is to impart to the students an ability to use deductive reasoning for drawing correct conclusions. Rather than merely memorizing a list of geometric facts, students must learn how to use known facts to verify the truth of additional facts and to solve geometric problems. The most important geometric facts are the ones that the students use most frequently, and students will learn them by using them. Therefore, the main objective of this course in plane geometry is to teach students how to think *naturally*, *logically*, and *systematically* whenever they encounter a proof to write, a construction to make, or a problem to solve.

While not all students who take a course in plane geometry will use the geometric facts in their daily lives, the mental skill of reasoning correctly is valuable in all areas of life. From interpreting Scripture correctly to studying mathematics or zoology; from reading a computer program to tracking down the problem in a faulty automobile engine—logic is essential. Learning how to think logically provides students with a tool they may use throughout life to perform such tasks as identifying the

flaw in the argument of a politician, determining which car is the better buy, etc. Certainly, the skill of reasoning correctly is not limited to mathematical applications.

Each video lesson is about 45 minutes in length and will best fit into a 50-minute class period. Five minutes is allowed for you to check homework. You will need to give quizzes and tests personally.

Establish accountability on the part of each student. Let students know you expect them to listen, to learn, to practice, and to participate every day.

When a student is absent, check the Daily Guides for the days he missed to see what homework he needs to make up. He may need to watch video lessons he missed or be helped by you or another student in order to catch up with the class.

Note: Lessons have been recorded for only 170 days, although most school years are longer. The extra days are allowed for the scheduling of field trips or special school events.

Subject Description

Responsibilities of the Classroom Teacher

1. **Checking Equipment.** Check the equipment each day to make sure it is running properly. Be ready to start on the correct lesson.
2. **Following the Daily Guides.** Check your Daily Guides each day to determine specific responsibilities for that day.
3. **Checking Homework.** Check daily at the beginning of class to see that each student has completed his homework. Although students may not completely understand a problem, they should attempt every problem. Spot-check this homework quickly (using the Solution Key) to see whether students are completing the homework problems accurately. This check will help you to identify
4. **Giving Practice Exercises.** You will be assigning and dictating answers for the *Plane Geometry Practice Exercises* at the beginning of most lessons from the third week of school until the last month. These short exercises are designed for students to review and practice mathematical skills and concepts which have been studied in previous courses. Answers to the practice exercises are found in the Appendix of this manual.
5. **Giving Quizzes and Tests.** You will be giving quizzes and tests/exams as they

occur in the lessons. Plan to remain in the classroom during any quiz or test. Grade the quizzes in class with students and grade the tests after school. The tests and quizzes

are found in *Plane Geometry* Tests/Quizzes. Further quizzing and testing information is provided in the Giving/Grading Quizzes and Tests section of this manual.

Class Schedule

The following is a typical class schedule for *Plane Geometry* with suggested times for students to participate.

1. **Homework Check.** Begin each day with the homework check. Walk around the room and look at each student's work; spot-check for accuracy. Assign practice exercises for students to do while you check homework. This check should be completed in about 5 minutes. Before turning on the video for homework discussion, go over the answers for the practice exercises. The manual lessons give more details concerning practice exercises. (See les. 11.) Certain exercises which are noted in the Daily Guides are graded. Grade these practice exercises using the same procedures as for grading quizzes.
2. **Homework Presentation.** At the beginning of each video lesson, homework problems are discussed and answered. Video students write their homework problems on the chalkboard and present their work and the answers. Your students should compare their work with the answers on video and make any corrections needed. (If your students are doing especially well, you may occasionally wish to have them explain the homework themselves and then go directly to the lesson. If students are having difficulty, you may need to allow them to see the homework presentation on video first and then briefly explain the problems again themselves before going on to the lesson. Your goal, of course, is for students to really understand—not merely listen to—the video explanations.)
3. **Quizzes and Tests.** Quizzes are usually given after homework check. The Daily Guides or the video will indicate when to give the quiz. Printed quizzes are from Tests/Quizzes, with answers and suggested point values in the Test/Quiz Key. The video teacher gives the first quiz on the video as an example. Have students take the first quiz as they watch the video. View this quiz with students to note the procedure used by the video teacher.
4. **Review and Lesson.** After the homework has been discussed, the video teacher reviews important principles and presents new material. Have students follow the lesson as they are instructed on the video. It is vital that students pay close attention, use their books, and follow the question-and-answer exchange given on the video. Tell students to answer the teacher's questions in their minds (or aloud) and to follow closely the answers given by the video students. Close attention to this portion of the video lesson will help them to learn and to retain the facts and principles they need to know.
5. **Practice.** Students will be assigned problems to practice from the text. If students are not having difficulty with the work, assign an appropriate number of students to put their work on the chalkboard and present it to the class. If students are having great difficulty with the assigned practice, then they need to closely view the explanations that are given on the video. If you have a particularly good student, you may have him help another student during practice.
6. **Homework Assignment.** The video teacher gives the homework assignment at the conclusion of each lesson. Students should copy this assignment into their assignment notebook.

Additional Help for Students

If you have a student who needs additional help, consider assigning more problems from the textbook. You might also have a qualified

student conduct a help class (once each week or as needed) for those students who need additional help.

Student Geometry Notebooks

Each student will compile a geometry notebook for a review resource and study guide. The notebook will consist of the following seven sections:

1. Terms and Definitions
2. Constructions
3. Principles/Axioms/Postulates
4. Informal Statements/Properties/Transformations
5. Theorems/Corollaries

6. Proofs of Theorems and Corollaries

7. Class Notes/Homework Problems

The sections should be separated by labeled notebook dividers. This notebook should be a loose-leaf notebook so that pages can be inserted as the notebook is completed. The video teacher will explain the notebook more thoroughly to the students as the year progresses. The Daily Guides contain instructions for periodically checking the notebooks and keeping them updated.

Sample Pages from a Geometry Notebook

Purpose for Notebook

– to help you begin thinking Geometry thoughts

Notebook Divisions

1. Terms/Definitions
2. Constructions
3. Principles / Axioms
4. Informal Statements
5. Theorems / Corollaries
6. Proofs of Theorems
7. Class Notes

Terms/Definitions

1. Geometry —the study that deals with the properties, measurements, and construction of flat figures, such as angles, triangles, and rectangles; and of solid figures, such as cubes, pyramids, etc.
2. Line —the straight path that extends infinitely in both directions.
3. Point —the location in space that has no size or shape.
4. Plane —a flat surface that extends infinitely in any two directions.
5. Line segment —a part of a line with two endpoints.
6. Equal segments —line segments that have the same length.

Axioms

1. Quantities that are equal to the same quantity or to equal quantities are equal to each other (p. 45).
2. If equals are added to equals, the sums are equal (p. 46).
3. If equals are subtracted from equals, the remainders are equal (p. 47).
4. Doubles of equals are equal (p. 48).
5. Halves of equals are equal (p. 49).

Theorems

1. Two triangles are congruent if two sides and the included angle of one are equal respectively to two sides and the included angle of the other (S.A.S.) p. 57.
2. Two triangles are congruent if a side and the two adjacent angles of one are equal respectively to a side and the two adjacent angles of the other (A.S.A.) p. 61.
3. In any isosceles triangle the angles opposite the equal sides are equal, p. 66.
4. Two triangles are congruent if the three sides of one are equal respectively to the three sides of the other (S.S.S.) p. 70.

Giving/Grading Quizzes and Tests

Procedure for Giving Quizzes

1. Have students clear their desks and take out one clean sheet of paper, a pen, and a pencil. Students should take quizzes in pencil and grade them in pen.
2. Distribute the quizzes. (The quizzes are located in *Plane Geometry Tests/Quizzes*.)
3. Have students use the sheet of paper as a cover sheet.
4. When students have finished taking the quiz, have them put their pencils and cover sheet off their desks and grade in pen. Have the students exchange papers for grading. Tell them to sign the paper they will be grading.
5. Give instructions for grading—how many points to deduct for each wrong answer and how to mark papers. (Having students grade papers in a uniform manner saves you time when you go through the papers later.) Suggested point values for each problem are given in the *Plane Geometry Test/Quiz Key*.
6. Give correct answers.
7. Have students figure the final grade by subtracting from 100 the number of points missed. The grade should be written in the space provided.
8. If a student has a question about the paper he is grading, have him place a question mark both by the number in question and by the grade at the top.
9. Instruct students to return papers to the owners, who should check them briefly and then pass them to the front.
10. Go through the quizzes later, checking for question marks, adjusting the scores (if necessary), and writing the grades at the top in red. Record the grades.

Procedure for Giving Tests

1. Students clear their desks of everything except one clean sheet of paper (for a cover sheet) and two pencils.
2. Distribute the tests. (Tests are located in *Plane Geometry Tests/Quizzes*.) Students should write their name at the top of the test paper.
3. Explain any special directions. Students should finish in the time allotted. Also tell students what they are to do when they finish the test (where to turn in their papers, what to study, etc.).
4. Students take the test in pencil, working out problems, and writing the answers directly on the test paper. Have them keep their answers covered at all times with the blank sheet of paper.
5. Always watch students until all tests have been turned in.
6. Check that all tests have been collected. Grade the tests yourself. Do not grade tests in class. Answers and suggested point values are given in the *Plane Geometry Test/Quiz Key*. It is best not to record the grades in your grade book until after going over the test in class.
7. Have all tests graded and ready to return in the next lesson.

Procedure for Going over Tests

1. Students clear their desks of everything except a pen. Distribute graded tests.
2. To go over the test, select several questions that may have caused difficulty on the test. Pick several students with the correct solutions to put them on the chalkboard. While they are doing this, go over the other answers with the students; then have the students at the chalkboard present their solutions.
3. Watch students carefully while you are going over the test. They should not have any pencils out while they have the tests.
4. If students find a question that has been graded incorrectly, they should write (in pen) the number of the incorrectly graded question and put a question mark next to the score on the first page.
5. Collect tests, check any question marks, and record grades.

Averaging Grades

Grades are averaged at the end of each nine-weeks period. In your grade book, record the grades of tests in red ink and the quiz grades in blue or black ink. At the end of the nine-weeks period, follow this procedure:

1. Average the quiz grades, including the practice exercises average. This is the **quiz average** and counts as **one third** of the nine-weeks grade.
2. Average together the tests that occurred during the nine weeks. This is the **test average** and counts as **one third** of the nine-weeks grade.
3. The **cumulative exams** (Nine-Weeks or Semester or Final Exam) count as the final **one third** of the nine-weeks grade for that quarter.

Example:

$$\begin{array}{r}
 \text{Quiz average:} \quad 96 \\
 \text{Test average:} \quad 94 \\
 \text{Cumulative test:} \quad + \underline{92} \\
 \hline
 282 \div 3 = 94\% \text{ (Nine-weeks grade)}
 \end{array}$$

4. Figure a **semester average** by averaging the two nine-weeks grades for that semester.

Example:

$$\begin{array}{r}
 \text{First nine-weeks:} \quad 94 \\
 \text{Second nine-weeks:} \quad + \underline{86} \\
 \hline
 180 \div 2 = 90\% \text{ (Semester grade)}
 \end{array}$$

Plane Geometry

Daily Guides

Daily Guides

It is **IMPORTANT** . . .

to train the student to respond along with the video class as they review, have class drill, and respond to class questions. This is most effective in student mastery of the subject content and emphasizes what the teacher considers important. Daily learning is reinforced here.

Student test scores will usually reflect this mental participation—either for good or for bad.

The classroom video teacher from time to time may mention things to enhance the class that your students may or may not be able to participate in. The video manual will not necessarily mention such activities.

Lesson 1

Materials Needed:

Plane Geometry (optional—to show students)

Teacher Instructions:

1. Prepare a seating chart. Assign seats before starting the video.
2. Explain school procedures / rules for your classroom.
3. Be sure each student has a copy of *Plane Geometry* (referred to as the *text* throughout).
4. Turn on the video. (You may wish to watch the first video lesson with the class to become familiar with classroom procedures.)
5. If time remains after each video lesson, allow students to begin their homework.

Homework:

Set up your geometry notebook. Include extra sheets of paper in each division as well as today's notes.

Page 4: Ex. 1.2, numbers 1–3 (all)

Lesson 2

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check. Instruct students to have their homework on their desks for you to check when class begins. (Refer to the guidelines for checking homework in the front of this manual.) Check to see that each student has set up his geometry notebook and has included in it notes from les. 1. Check homework for completeness. It is not necessary for you to grade the homework, but check to see that the work is neat. The video teacher goes over the answers on video. Occasionally spot-check your students' answers for accuracy, using the *Plane Geometry* Solution Key. Do this throughout the year.
(During HW check, students review terms, definitions, and facts from les. 1.)
2. Turn on the video.

Homework:

Update your geometry notebook.

Pages 6–7: Ex. 1.3B, numbers 1–11 (odd)

Lesson 3

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check. Check for completeness. Spot-check for accuracy using the *Plane Geometry* Solution Key.
(During HW check, students review terms, definitions, and facts from les. 1 and 2.)
2. Turn on the video.

Homework:

Update your geometry notebook.

Page 9: Ex. 1.4, numbers 1–4 (all)

Lesson 4

Materials Needed:

Plane Geometry Solution Key

Quiz 1 (one for each student; located in *Plane Geometry* Tests / Quizzes)

Teacher Key for Quiz 1 (from *Plane Geometry* Test / Quiz Key)

Teacher Instructions:

1. Homework Check. Check for completeness. Spot-check for accuracy, using the Solution Key.
(During HW check, students review terms, definitions, and facts from les. 1–3.)
2. Turn on the video.
3. Students will take **Quiz 1** with the video class. Watch the video to see the teacher's procedures. Distribute the quizzes to your students. Ten minutes is allowed for students to take and grade Quiz 1. You will be giving all future quizzes. (Refer to the front of this manual for detailed instructions about giving and grading quizzes.)
4. Collect quizzes and record grades. (See the Test / Quiz Key for answers and suggested point values; subtract from 100 the total points missed.)

Note: Due to a grading scale change, please use the point values given in the *Plane Geometry* Test / Quiz Key rather than the point values given by the video teacher.

Homework:

Update your geometry notebook.
Pages 10–11: Ex. 1.5, numbers 2, 3, 5, and 7

Lesson 5

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check. Continue throughout the year to check homework for completeness and spot-check for accuracy, using the Solution Key. This instruction will not be repeated daily unless something special is to be checked.
(During HW check, students review terms, definitions, and facts from les. 1–3.)
2. Turn on the video.

Homework:

Update your geometry notebook.
Bring a protractor for the next lesson.
Page 12: Ex. 1.6, numbers 1–9 (odd)

Lesson 6

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review terms, definitions, and principles from pp. 7–12.)
2. Turn on the video.

Homework:

Update your geometry notebook. (Continue throughout the year updating your notebook. This assignment will not be repeated daily unless something special is to be completed.)
Pages 13–14: Ex. 1.7, numbers 1–15 (odd)

Lesson 7

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review principles 1–12 in their geometry notebook.)
2. Turn on the video.

Homework:

Page 15: Ex. 1.8, numbers 1–9 (odd)

Lesson 8

Materials Needed:

Plane Geometry Solution Key
Quiz 2 (one for each student; located in *Plane Geometry* Tests/Quizzes)
Teacher Key for Quiz 2 (located in *Plane Geometry* Test/Quiz Key)

Teacher Instructions:

1. Homework Check.
(During HW check, students review sections 1.5–1.7 in the text.)
2. Students clear their desks and take out quiz materials (one clean sheet of paper for a cover sheet, a pen, and a pencil) before quizzes are distributed.
3. Students will take **Quiz 2**. (Refer to the front of this manual for detailed instructions about giving and grading quizzes.)
4. Collect quizzes and record grades. (See the Test/Quiz Key for answers and suggested point values; subtract from 100 the total points missed.)
5. Turn on the video.

Homework:

Page 17: Review Exercises, numbers 1, 3, and 7
Page 19: Ex. 1.10B, numbers 5, 6, and 9

Lesson 9

Materials Needed:

Plane Geometry Solution Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review sections 1.8–1.10 in the text.)
2. Turn on the video.

Homework:

Page 21: Ex. 1.11, numbers 1, 5, 6, and 11

Lesson 10**Materials Needed:**

Plane Geometry Solution Key
Quiz 3 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review sections 1.8–1.11 in the text.)
2. Students clear their desks and take out quiz materials (one clean sheet of paper for a cover sheet, a pen, and a pencil) before quizzes are distributed.
3. Students will take **Quiz 3**. (Refer to the front of this manual for detailed instructions about giving and grading quizzes.)
4. Collect quizzes and record grades. (See the Test/Quiz Key for answers and suggested point values; subtract from 100 the total points missed.)
5. Turn on the video.

Homework:

Page 22: Ex. 1.12, numbers 5, 7, 9, 11, and 12

Lesson 11**Materials Needed:**

Plane Geometry Practice Exercises (one for each student)
Answer Key for *Plane Geometry Practice Exercises* (located in the Appendix of this manual)

Teacher Instructions:

1. Homework Check. Students begin today (during homework check time—approximately 2–4 minutes) to work plane geometry practice exercises for review and rein-

forcement. Have students take out a sheet of paper and head it correctly. Then have them answer Practice Exercise 1 on the sheet of paper while homework is being checked for completeness. After homework is checked, give the answers to the practice exercise before turning on the video. Students should write the number correct in the top right-hand corner of the sheet of notebook paper. Collect the papers. You may want to tell the students that sometimes the practice exercises will be graded. They will not know when they are graded until after they have done the problems. These video lesson pages will tell you when to grade the practice exercises.

(During HW check, students do Practice Exercise 1.)

2. Check geometry notebook for completion. A brief checking procedure such as the following should be sufficient:
 - a. Is the Terms and Definitions section complete?
 - b. Are Principles 1–12 present in the proper division?
 - c. Are the Class Notes neatly arranged in the appropriate section?
 - d. Are the Homework Problems complete and filed under the proper heading?
 Encourage your students to keep their notebooks organized and neatly arranged. An orderly geometry notebook can be a valuable study guide for quizzes and tests.
3. Turn on the video.

Homework:

Page 24: Ex. 1.13, numbers 5 and 7–10

Begin to prepare for a test over sections 1.1–1.14 in les. 14.

Lesson 12**Materials Needed:**

Plane Geometry Practice Exercises
Answer Key for *Plane Geometry Practice Exercises*
(Since students do practice exercises every day except test days and the day after tests, these materials will not continue to be listed here. Have them available daily.)

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 2. They should always do the work on their own paper. Collect the papers.)
2. Turn on the video.

Homework:

Page 25: Ex. 1.14, numbers 6–8, 10, and 11

Lesson 13**Materials Needed:**

Quiz 4 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 3. They should always do the work on their own paper. Collect the papers.)
2. Turn on the video.
3. Students clear their desks and take out quiz materials (one clean sheet of paper for a cover sheet, a pen, and a pencil) before quizzes are distributed.
4. Students will take **Quiz 4**. (Refer to the front of this manual for detailed instructions about giving and grading quizzes.)
5. Collect quizzes and record grades. (See the Test/Quiz Key for answers and suggested point values; subtract from 100 the total points missed.)
6. Turn on the video.

Homework:

Study for Test 1 over text sections 1.1–1.14 in the next lesson.

Lesson 14**Materials Needed:**

Test 1 (one for each student; located in *Plane Geometry Tests/Quizzes*)
Teacher Key for Test 1 (located in *Plane Geometry Test/Quiz Key*)

Teacher Instructions:

1. There is no written homework to check.
2. There is no homework assignment.
3. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
4. Turn on the video.
5. After watching the video for test instructions, give **Test 1** over sections 1.1–1.14. You will be giving all future tests. (Refer to the front of this manual for testing procedures.)
6. Collect and grade tests. (See the Test/Quiz Key for answers and suggested point values; subtract from 100 the total number of points missed.)
7. Plan to return graded tests in les. 15.

Lesson 15**Materials Needed:**

Graded Test 1 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no homework to check.
2. Hand back and go over graded **Test 1**. Refer to the front of this manual for detailed procedures for going over tests. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 26: Ex. 1.15, numbers 1–6

Lesson 16**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 4.)
2. Turn on the video.

Homework:

Page 29: Ex. 1.17, numbers 1–7 (odd) and 8

Lesson **17****Materials Needed:**

Quiz 5 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 5. Grade this as **Practice Exercise Quiz 1**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 1–3, average the three grades and count as one regular quiz grade.)
2. Students clear their desks and take out quiz materials (one clean sheet of paper for a cover sheet, a pen, and a pencil) before quizzes are distributed.
3. Students will take **Quiz 5**. (Refer to the front of this manual for detailed instructions about giving and grading quizzes.) Follow this procedure for the remainder of the year.
4. Collect quizzes and record grades. (See the Test / Quiz Key for answers and suggested point values; subtract from 100 the total points missed.)
5. Turn on the video.

Homework:

Pages 31–32: Ex. 1.18, numbers 4–7
Page 32: Ex. 1.19, number 4
Page 33: Ex. 1.20, number 5

Lesson **18****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 6.)
2. Turn on the video.

Homework:

Pages 33–34: Do Constructions 4 and 5 one time each.
Page 34: Ex. 1.21, numbers 3–5
Pages 34–35: Ex. 1.22, numbers 2–4

Lesson **19****Materials Needed:**

Quiz 6 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 7.)
2. Turn on the video.
3. Stop the video; give, grade, and collect **Quiz 6**.
4. Turn on the video.

Homework:

Page 35: Ex. 1.23, numbers 1 and 2
Page 36: Ex. 1.24, number 2
Read page 37.
Page 37: Ex. 1.26, numbers 1–5

Lesson **20****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 8.)
2. Turn on the video.

Homework:

Pages 38–39: Write each axiom and postulate one time.
Prepare for a construction quiz in the next lesson.

Lesson **21****Materials Needed:**

Quiz 7 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 9.)
2. Give, grade, and collect **Quiz 7**.
3. Turn on the video.

Homework:

Page 43: Ex. 1.27, numbers 1–3 and 6

Lesson **22****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 10.)
2. Turn on the video.

Homework:

Have each axiom and postulate memorized.

Lesson **23****Materials Needed:**

Quiz 8 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 11.)
2. Give, grade, and collect **Quiz 8**.
3. Turn on the video.

Homework:

Pages 49–50: Ex. 2.2, numbers 3–7. Notice that partial proofs are provided for problems 3, 5, and 7. Copy the diagram and proof for each and fill in the blanks. Copy and complete both proofs for problem 7.

Lesson **24****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 12.)
2. Turn on the video.

Homework:

Page 52: Ex. 2.3, numbers 3–5

Lesson **25****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 13.)
2. Turn on the video.

Homework:

Pages 52–53: Ex. 2.3, numbers 7, 9, and 14

Lesson **26****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 14. Grade this as **Practice Exercise Quiz 2**. Suggested scale: 9 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 1–3, average the three grades and count as one regular quiz grade.)
2. Turn on the video.

Homework:

Pages 56–57: Ex. 2.4, numbers 2, 4, and 6

Lesson **27****Materials Needed:**

Quiz 9 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 15.)
2. Give, grade, and collect **Quiz 9**.
3. Turn on the video.

Homework:

Pages 53–54: Ex. 2.3, numbers 13 and 15

Lesson **28****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 16.)
2. Turn on the video.

Homework:

Study for Test 2 over sections 1.15–2.4.

Lesson 29**Materials Needed:**

Test 2 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 2** over sections 1.15–2.4. (Refer to the front of this manual for testing procedures.) Follow this procedure for the remainder of the year.
6. Collect and grade tests. (See the Test/Quiz Key for answers and suggested point values; subtract from 100 the total number of points missed.)
7. Plan to return graded test in les. 30.

Homework:

Read p. 44.

Lesson 30**Materials Needed:**

Graded Test 2 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 2. Collect tests and record grades.
3. Turn on the video.

Homework:

Pages 58–59: Ex. 2.5, numbers 3, 4b, and 5

Lesson 31**Teacher Instructions:**

1. Homework Check. Spot-check to see that students have included Constructions 1–8 and Theorems 1–4 in their notebook.
(*During HW check, students do Practice Exercise 17.*)
2. Turn on the video.

Homework:

Pages 62–63: Ex. 2.7, numbers 1 and 4d–g

Lesson 32**Materials Needed:**

Quiz 10 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(*During HW check, students do Practice Exercise 18.*)
2. Give, grade, and collect **Quiz 10**.
3. Turn on the video.

Homework:

Pages 65–66: Ex. 2.8, numbers 3, 5, and 7

Lesson 33**Teacher Instructions:**

1. Homework Check.
(*During HW check, students do Practice Exercise 19.*)
2. Turn on the video.

Homework:

Page 66: Ex. 2.8, numbers 8–10

Lesson 34**Materials Needed:**

Quiz 11 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(*During HW check, students do Practice Exercise 20.*)
2. Give, grade, and collect **Quiz 11**.
3. Turn on the video.

Homework:

Page 68: Ex. 2.9, numbers 2, 6, and 7

Lesson **35****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 21.)
2. Turn on the video.

Homework:

Page 70: Ex. 2.10, numbers 1a, 2, and 4. Also, add Corollary 7-3 to your notebook and prove it.

Lesson **36****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 22.)
2. Turn on the video.

Homework:

Page 73: Ex. 2.11, numbers 2 and 3. Also, add Corollary 8-4 to your notebook and prove it.

Lesson **37****Materials Needed:**

Quiz 12 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 23.)
2. Give, grade, and collect **Quiz 12**.
3. Turn on the video.

Homework:

Pages 73–74: Ex. 2.11, numbers 7–9

Lesson **38****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 24.)
2. Turn on the video.

Homework:

Page 74: Ex. 2.11, numbers 12–15. Problem 12 does not require a proof.

Lesson **39****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 25.)
2. Turn on the video.

Homework:

Page 79: Ex. 2.13, number 7
Page 82: Ex. 2.14, numbers 2 and 4

Lesson **40****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 26.)
2. Turn on the video.

Homework:

Page 82: Ex. 2.14, numbers 3 and 6

Lesson **41****Materials Needed:**

Quiz 13 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 27. Grade this as **Practice Exercise Quiz 3**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. Average the grades for Practice Exercise Quizzes 1–3 and **count** as one regular **quiz grade**.)
2. Give, grade, and collect **Quiz 13**.
3. Turn on the video.

Homework:

Page 82: Ex. 2.14, numbers 5 and 8

Lesson **42****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 28.)
2. Turn on the video.

Homework:

Page 82: Ex. 2.14, number 11
Page 89: Ex. 2.16, number 1

Lesson **43****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 29.)
2. Turn on the video.

Homework:

Study for Test 3 (Nine-Weeks Exam) over sections 1.1–2.16 in the next lesson. Bring a compass and straightedge for the test.

Lesson **44****Materials Needed:**

Test 3 and Test / Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 3** (Nine-Weeks Exam) over sections 1.1–2.16. (Refer to the front of this manual for testing procedures.) Collect and grade tests.
6. Plan to return graded tests in les. 45.

Homework:

Read p. 81.

Lesson **45****Materials Needed:**

Graded Test 3 (return to students) and Test / Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 3. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 90: Ex. 2.16, numbers 3–6

Lesson **46****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 30.)
2. Turn on the video.

Homework:

Page 90: Ex. 2.16, numbers 8 and 10

Lesson **47****Materials Needed:**

Quiz 14 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 31.)
2. Give, grade, and collect **Quiz 14**.
3. Turn on the video.

Homework:

Add Theorem 20 to your notebook and prove it.
Page 95: Ex. 2.18, numbers 4 and 8

Lesson **48****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 32.)
2. Turn on the video.

Homework:

Page 96: Ex. 2.19, numbers 1, 3, 4, and 7

Lesson 49**Materials Needed:**

Quiz 15 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 33.)
2. Give, grade, and collect **Quiz 15**.
3. Turn on the video.

Homework:

Page 97: Ex. 2.20, numbers 1, 8, and 12

Lesson 50**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 34.)
2. Turn on the video.

Homework:

Pages 101–102: Ex. 2.21, numbers 1, 2, 8, and 9
Be prepared for a geometry notebook check in les. 53.

Lesson 51**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 35.)
2. Turn on the video.

Homework:

Page 102: Ex. 2.21, numbers 4 and 10
Page 106: Ex. 2.22, numbers 1 and 4

Lesson 52**Materials Needed:**

Quiz 16 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 36.)
2. Turn on the video.
3. Stop the video; give, grade, and collect **Quiz 16**.
4. Turn on the video.

Homework:

Add Theorem 29, Corollary 29-1, and Theorem 30 to your notebook. Do not prove them.
Page 111: Ex. 2.24, numbers 1–4
Geometry notebooks will be checked in the next lesson.

Lesson 53**Teacher Instructions:**

1. Homework Check. Spot-check to see that recent theorems are written in each student's notebook (through Theorem 30); also check to see that completed homework assignments have been placed in the proper location.
(During HW check, students do Practice Exercise 37.)
2. Turn on the video.

Homework:

Page 111: Ex. 2.24, number 6
Page 113: Ex. 2.25, numbers 1 and 2

Lesson 54**Materials Needed:**

Quiz 17 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 38.)
2. Give, grade, and collect **Quiz 17**.
3. Turn on the video.

Homework:

Page 118: Ex. 2.30, numbers 1, 5, and 8

Lesson **55****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 39. Grade this as **Practice Exercise Quiz 4**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 4–6, average the three grades and count as one regular quiz grade.)
- Turn on the video.

Homework:

Pages 118–119: Ex. 2.31, numbers 1, 6, and 18

Lesson **56****Materials Needed:**

Quiz 18 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 40.)
- Give, grade, and collect **Quiz 18**.
- Turn on the video.

Homework:

Pages 120–121: Ex. 2.33, numbers 3, 4, and 9

Lesson **57****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 41.)
- Turn on the video.

Homework:

Study for Test 4 over sections 2.17–2.33 in the next lesson.

Lesson **58****Materials Needed:**

Test 4 and Test/Quiz Key

Teacher Instructions:

- There is no written homework to check.
- There is no video today.
- Announce the homework assignment.
- Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
- Give **Test 4** over sections 2.17–2.33. Collect and grade tests.
- Plan to return graded tests in les. 59.

Homework:

Read pp. 92 and 129–130.

Lesson **59****Materials Needed:**

Graded Test 4 (return to students) and Test/Quiz Key

Teacher Instructions:

- There is no written homework to check.
- Hand back and go over graded Test 4. Collect tests and record grades.
- Turn on the video.

Homework:

Page 122: Ex. 2.34, numbers 4 and 9

Lesson **60****Materials Needed:**

Quiz 19 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 42.)
- Give, grade, and collect **Quiz 19**.
- Turn on the video.

Homework:

Page 124: Ex. 2.36, numbers 3, 7, 9, and 12a

Lesson **61****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 43. Grade this as **Practice Exercise Quiz 5**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 4–6, average the three grades and count as one regular quiz grade.)
- Turn on the video.

Homework:

Page 125: Ex. 2.37, numbers 5 and 7
Page 127: Ex. 2.38, number 8

Lesson **62****Materials Needed:**

Quiz 20 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 44.)
- Give, grade, and collect **Quiz 20**.
- Turn on the video.

Homework:

Page 133: Ex. 3.1, numbers 3 and 5

Lesson **63****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 45.)
- Turn on the video.

Homework:

Page 134: Ex. 3.2, numbers 1, 2, and 6

Lesson **64****Materials Needed:**

Quiz 21 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 46.)
- Give, grade, and collect **Quiz 21**.
- Turn on the video.

Homework:

Page 135: Ex. 3.3, number 1a
Page 136: Ex. 3.4, number 1

Lesson **65****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 47.)
- Turn on the video.

Homework:

Page 134: Ex. 3.2, number 5
Page 137: Ex. 3.5 (There is only one problem.)

Lesson **66****Materials Needed:**

Quiz 22 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 48.)
- Give, grade, and collect **Quiz 22**.
- Turn on the video.

Homework:

Page 138: Ex. 3.6, numbers 1 and 3

Lesson **67****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 49.)
- Turn on the video.

Homework:

Page 141: Ex. 3.7, numbers 2 and 4–6

Lesson **68****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 50.)
2. Turn on the video.

Homework:

Page 141: Ex. 3.7, numbers 8, 11, and 14

4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 5** over sections 2.34–3.8. Collect and grade tests.
6. Plan to return graded tests in les. 72.

Homework:

Read pp. 167 and 172.

Lesson **69****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 51.)
2. Turn on the video.

Homework:

Page 143: Ex. 3.8, numbers 1–3

Lesson **72****Materials Needed:**

Graded Test 5 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 5. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 144: Ex. 3.9, numbers 1 and 2

Lesson **70****Materials Needed:**

Quiz 23 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 52.)
2. Give, grade, and collect **Quiz 23**.
3. Turn on the video.

Homework:

Study for Test 5 over sections 2.34–3.8 in the next lesson.

Lesson **73****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 53.)
2. Turn on the video.

Homework:

Page 146: Ex. 3.10, numbers 4, 5, and 9

Lesson **71****Materials Needed:**

Test 5 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.

Lesson **74****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 54.)
2. Turn on the video.

Homework:

Pages 147–148: Ex. 3.12, numbers 10 and 14

Lesson **75****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 55.)
2. Turn on the video.

Homework:

Pages 151–152: Ex. 3.14, numbers 3, 4, and 6

Lesson **76****Materials Needed:**

Quiz 24 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 56.)
2. Give, grade, and collect **Quiz 24**.
3. Turn on the video.

Homework:

Page 152: Ex. 3.14 (top of the page),
numbers 5 and 8

Lesson **77****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 57.)
2. Turn on the video.

Homework:

Page 152: Ex. 3.15, (at bottom of page)
number 7
Page 153: Ex. 3.16, numbers 5 and 6

Lesson **78****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 58.)
2. Turn on the video.

Homework:

Page 154: Ex. 3.17, numbers 5–7 and 9

Lesson **79****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 59. Grade this as **Practice Exercise Quiz 6**. Suggested scale: 6 points off for each incorrect answer. Subtract from 100 the total number of points missed. Average the three grades for Practice Exercises 4–6 and count as one regular quiz grade.)
2. Turn on the video.

Homework:

Page 155: Ex. 3.18, numbers 3 and 5

Lesson **80****Materials Needed:**

Quiz 25 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 60.)
2. Give, grade, and collect **Quiz 25**.
3. Turn on the video.
Note: Students will take Test 6 (Semester Exam) in lesson 85. Plan to allow approximately 20–30 minutes extra for this exam. Students should not have more than two major exams in one day.

Homework:

Pages 156–157: Ex. 3.19A, numbers 4 and 6

Lesson **81****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 61.)
2. Turn on the video.

Homework:

Page 157: Ex. 3.19B, numbers 4 and 6

Lesson 82**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 62.)
2. Turn on the video.

Homework:

Page 158: Ex. 3.19D, numbers 1 and 9

Lesson 83**Materials Needed:**

Quiz 26 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 63.)
2. Give, grade, and collect **Quiz 26**.
3. Turn on the video.

Homework:

Page 159: Ex. 3.19F, numbers 5 and 6

Page 161: Ex. 3.19G, numbers 1–3

Lesson 84**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 64.)
2. Turn on the video.

Homework:

Study for Test 6 (Semester Exam) over sections 1.1–3.19 in the next lesson.

Lesson 85**Materials Needed:**

Test 6 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 6** over sections 1.1–3.19. Collect and grade tests.
Note: Students will take the Semester Exam. Plan to allow 20–30 minutes extra for this exam. Students should not have more than two major exams in one day.
6. Plan to return graded tests in les. 86.

Homework:

Geometry notebooks will be checked in les. 90. Bring compass and straightedge for the next lesson.

Read pp. 187–188.

Lesson 86**Materials Needed:**

Graded Test 6 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 6. Collect tests and record grades.
3. Turn on the video.

Homework:

Pages 162–163: Construction 4, Cases 1 and 2

Page 164: Ex. 3.21, numbers 1 and 4

Lesson 87**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 65.)
2. Turn on the video.

Homework:

Pages 164–166: Constructions 10, 11, and 12

Page 166: Ex. 3.24, number 1

Lesson **88****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 66.)
2. Turn on the video.

Homework:

Pages 166, 168: Constructions 13 and 14
Page 168: Ex. 3.26, numbers 1 and 2

Lesson **89****Materials Needed:**

Quiz 27 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 67.)
2. Give, grade, and collect **Quiz 27**.
3. Turn on the video.

Homework:

Prepare for geometry notebook check in the next lesson.
Page 168: Ex. 3.26, numbers 4 and 5

Lesson **90****Materials Needed:**

Quiz 28 and Test/Quiz Key

Teacher Instructions:

1. Homework Check. Spot-check to see that recent theorems (through Theorem 46) and recent constructions (through Construction 16) are written in each student's notebook.
(During HW check, students do Practice Exercise 68.)
2. Give, grade, and collect **Quiz 28**.
3. Turn on the video.

Homework:

Pages 173–174: Ex. 3.29, numbers 2–8 (even)

Lesson **91****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 69. Grade this as **Practice Exercise Quiz 7**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 7–9, average the three grades and count as one regular quiz grade.)
2. Turn on the video.

Homework:

Pages 174–176: Memorize the concept and picture for locus Theorems 47–52.

Lesson **92****Teacher Instructions:**

1. There is no written homework to check.
(Students do Practice Exercise 70.)
2. Turn on the video.

Homework:

Page 177: Ex. 3.31, numbers 8–10

Lesson **93****Materials Needed:**

Quiz 29 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 71.)
2. Give, grade, and collect **Quiz 29**.
3. Turn on the video.

Homework:

Page 178: Ex. 3.32, numbers 2–8 (even)

Lesson **94****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 72.)
2. Turn on the video.

Homework:

Page 181: Ex. 3.33, numbers 1–3 and 10

Lesson **95****Materials Needed:**

Quiz 30 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 73.)
2. Give, grade, and collect **Quiz 30**.
3. Turn on the video.

Homework:

Page 182: Ex. 3.33, numbers 14, 16, 20, and 21

Lesson **96****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 74.)
2. Turn on the video.

Homework:

Pages 182–183: Ex. 3.34, numbers 2, 5, 10, and 12

Lesson **97****Materials Needed:**

Quiz 31 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 75.)
2. Give, grade, and collect **Quiz 31**.
3. Turn on the video.

Homework:

Page 184: Ex. 3.37, numbers 4, 6, and 8
Page 185: Ex. 3.38, number 2

Lesson **98****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 76.)
2. Turn on the video.

Homework:

Study for Test 7 over sections 3.20–3.38 in the next lesson.

Lesson **99****Materials Needed:**

Test 7 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 7** over sections 3.20–3.38. Collect and grade tests.
6. Plan to return graded tests in les. 100.

Homework:

Read pp. 202 and 217–218.

Lesson **100****Materials Needed:**

Graded Test 7 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 7. Collect tests and record grades.
3. Turn on the video.

Homework:

Pages 191–192: Ex. 4.1, numbers 4, 5, and 7–11. On exercises with lettered problems, do letters b, d, and f.

Lesson 101**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 77.)
2. Turn on the video.

Homework:

Page 194: Ex. 4.2, numbers 1b, 5, 6b, and 7–9

Lesson 102**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 78.)
2. Turn on the video.

Homework:

Page 196: Ex. 4.3, numbers 2, 3, 5b, and 7

Lesson 103**Materials Needed:**

Quiz 32 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 79. Grade this as **Practice Exercise Quiz 8**. Suggested scale: 7 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 7–9, average the three grades and count as one regular quiz grade.)
2. Give, grade, and collect **Quiz 32**.
3. Turn on the video.

Homework:

Page 199: Ex. 4.4, numbers 2–5

Lesson 104**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 80.)
2. Turn on the video.

Homework:

Page 199: Ex. 4.4, numbers 8–11

Lesson 105**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 81.)
2. Turn on the video.

Homework:

Page 201: Ex. 4.5, numbers 2, 3, 5, and 8

Lesson 106**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 82.)
2. Turn on the video.

Homework:

Page 204: Ex. 4.6, numbers 1–4

Lesson 107**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 83.)
2. Turn on the video.

Homework:

Pages 205–206: Prove Corollaries 57-1, 57-2, and 58-1.

Lesson 108**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 84.)
2. Turn on the video.

Homework:

Page 207: Ex. 4.7, numbers 3, 4, and 6

Lesson 109**Materials Needed:**

Quiz 33 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 85.)
2. Give, grade, and collect **Quiz 33**.
3. Turn on the video.

Homework:

Pages 208–209: Ex. 4.8, numbers 1, 4, and 11

Lesson 110**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 86.)
2. Turn on the video.

Homework:

Page 209: Ex. 4.9, number 1
Page 210: Ex. 4.10, numbers 3 and 4

Lesson 111**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 87. Grade this as **Practice Exercise Quiz 9**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. Average the grades

for Practice Exercise Quizzes 7–9 and count as one regular quiz grade.)

2. Turn on the video.

Homework:

Pages 210–211: Ex. 4.10, numbers 2, 7, 8, and 11

Lesson 112**Materials Needed:**

Quiz 34 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 88.)
2. Give, grade, and collect **Quiz 34**.
3. Turn on the video.

Homework:

Study for Test 8 over sections 4.1–4.10 in the next lesson.

Lesson 113**Materials Needed:**

Test 8 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 8** over sections 4.1–4.10. Collect and grade tests.
6. Plan to return graded test in les. 114.

Homework:

Read pp. 231–232.

Lesson 114**Materials Needed:**

Graded Test 8 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 8. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 211: Prove Corollary 62-1.

Page 212: Ex. 4.11, numbers 1–4

Lesson 115**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 89.)
2. Turn on the video.

Homework:

Page 213: Ex. 4.12, numbers 2, 3, 4, 6, and 7

Lesson 116**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 90.)
2. Turn on the video.

Homework:

Page 214: Ex. 4.12, numbers 13 and 14

Page 215: Ex. 4.13, numbers 1 and 3

Lesson 117**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 91.)
2. Turn on the video.

Homework:

Page 221: Ex. 4.17, numbers 1a, 2, and 7–9

Study for a quiz over sections 4.12–4.14.

Lesson 118**Materials Needed:**

Quiz 35 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 92.)
2. Give, grade, and collect **Quiz 35**.
3. Turn on the video.

Homework:

Bring compass and straightedge for the next several lessons.

Page 222: Ex. 4.18, numbers 1, 5, and 8

Lesson 119**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 93.)
2. Turn on the video.

Homework:

Page 224: Ex. 4.19, numbers 2 and 3

Page 225: Ex. 4.20, numbers 1 and 2

Lesson 120**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 94.)
2. Turn on the video.

Homework:

Page 226: Ex. 4.22, numbers 1 and 3 (For number 3, do only the first part.)

Lesson 121**Materials Needed:**

Quiz 36 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 95.)
2. Give, grade, and collect **Quiz 36**.
3. Turn on the video.

Homework:

Page 227: Ex. 4.23, numbers 3, 4 (first part only), 5, and 8. For problem 5, let the two lines have a ratio of 2:3.

Lesson 122**Materials Needed:**

Quiz 37 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 96.)
2. Give, grade, and collect **Quiz 37**.
3. Turn on the video.

Homework:

Page 228: Ex. 4.24, numbers 1 and 2
Page 230: Ex. 4.26, number 10

Lesson 123**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 97. Grade this as **Practice Exercise Quiz 10**. Suggested scale: 8 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 10–12, average the three grades and count as one regular quiz grade.)
2. Turn on the video.

Homework:

Pages 237–238: Ex. 5.2, numbers 2, 4, and 6

Lesson 124**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 98.)
2. Turn on the video.

Homework:

Page 240: Ex. 5.4, numbers 5–7 and 9

Lesson 125**Materials Needed:**

Quiz 38 and Test / Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 99.)
2. Give, grade, and collect **Quiz 38**.
3. Turn on the video.

Homework:

Page 240: Ex. 5.4, numbers 1, 2, and 8

Lesson 126**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 100.)
2. Turn on the video.

Homework:

Page 244: Ex. 5.6, numbers 1–3 and 5

Lesson 127**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 101.)
2. Turn on the video.

Homework:

Page 244: Ex. 5.6, numbers 14, 15, 17, and 18

Lesson **128****Materials Needed:**

Quiz 39 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 102.)
2. Give, grade, and collect **Quiz 39**.
3. Turn on the video.

Homework:

Do constructions 14, 17, and 19 once each.
Page 244: Ex. 5.6, numbers 16 and 20

Lesson **129****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 103.)
2. Turn on the video.

Homework:

Study for Test 9 over sections 3.20–5.6 in the next lesson.

Lesson **130****Materials Needed:**

Test 9 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 9** (Nine-Weeks Exam) over sections 3.20–5.6. Collect and grade tests.
6. Plan to return graded test in les. 131.

Homework:

Read pp. 241–242.

Lesson **131****Materials Needed:**

Graded Test 9 (return to students) and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 9. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 247: Ex. 5.8, numbers 1–3

Lesson **132****Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 104.)
2. Turn on the video.

Homework:

Page 249: Ex. 5.9, numbers 3, 4, 7, and 8

Lesson **133****Materials Needed:**

Quiz 40 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 105.)
2. Give, grade, and collect **Quiz 40**.
3. Turn on the video.

Homework:

Page 250: Ex. 5.10, numbers 1–3
Page 250: Ex. 5.11, numbers 4 and 5

Lesson **134****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 106. Grade this as **Practice Exercise Quiz 11**. Suggested scale: 6 points off for each incorrect answer. Subtract from 100 the total number of points missed. After you have grades for Practice Exercise Quizzes 10–12, average the three grades and count as one regular quiz grade.)
- Turn on the video.

Homework:

Page 252: Ex. 5.13, numbers 1–5

Lesson **135****Materials Needed:**

Quiz 41 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 107.)
- Give, grade, and collect **Quiz 41**.
- Turn on the video.

Homework:

Do Construction 21 one time.
Page 252: Ex. 5.13, numbers 6–8 and 15

Lesson **136****Materials Needed:**

Quiz 42 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 108.)
- Give, grade, and collect **Quiz 42**.
- Turn on the video.

Homework:

Pages 252–253: Ex. 5.13, numbers 16 and 18
Page 255: Ex. 5.15, number 3

Lesson **137****Materials Needed:**

Quiz 43 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 109.)
- Give, grade, and collect **Quiz 43**.
- Turn on the video.

Homework:

Page 256: Ex. 5.16, numbers 2, 5, and 7

Lesson **138****Teacher Instructions:**

- Homework Check.
(During HW check, students do Practice Exercise 110.)
- Turn on the video.

Homework:

Page 256: Ex. 5.16, numbers 8, 9, 13, and 14

Lesson **139****Materials Needed:**

Quiz 44 and Test/Quiz Key

Teacher Instructions:

- Homework Check.
(During HW check, students do Practice Exercise 111.)
- Give, grade, and collect **Quiz 44**.
- Turn on the video.

Homework:

Study for Test 10 over sections 5.7–5.17 in the next lesson.

Lesson **140****Materials Needed:**

Test 10 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 10** over sections 5.7–5.17. Collect and grade tests.
6. Plan to return graded test in les. 141.

Homework:

Read pp. 258 and 267.

Lesson 141**Materials Needed:**

Graded Test 10 (return to students) and
Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 10. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 261: Ex. 6.1, numbers 2 and 4–7

Lesson 142**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 112.)
2. Turn on the video.

Homework:

Page 263: Ex. 6.2, numbers 3, 4, 6, 8, and 9

Lesson 143**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 113.)
2. Turn on the video.

Homework:

Page 264: Ex. 6.2, numbers 16 and 17

Lesson 144**Materials Needed:**

Quiz 45 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students do Practice Exercise 114.)
2. Give, grade, and collect **Quiz 45**.
3. Turn on the video.

Homework:

Page 265: Ex. 6.3, numbers 2 and 3

Lesson 145**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 115.)
2. Turn on the video.

Homework:

Page 266: Ex. 6.5, numbers 4, 5, and 7

Lesson 146**Teacher Instructions:**

1. Homework Check.
(During HW check, students do Practice Exercise 116. Grade this as **Practice Exercise Quiz 12**. Suggested scale: 6 points off for each incorrect answer. Subtract from 100 the total number of points missed. Average the grades for Practice Exercise Quizzes 10–12 and count as one regular quiz grade.)
2. Turn on the video.

Homework:

Page 270: Ex. 6.6, numbers 1–17 (odd)

Lesson 147**Materials Needed:**

Quiz 46 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(*During HW check, students do Practice Exercise 117.*)
2. Give, grade, and collect **Quiz 46**.
3. Turn on the video.

Homework:

Page 272: Ex. 6.7A, numbers 2–12 (even)

Homework:

Page 273: Ex. 6.8, numbers 12–18 (even)

Lesson 151**Teacher Instructions:**

1. Homework Check.
(*During HW check, students review sections 6.2–6.5 in the text.*)
2. Turn on the video.

Homework:

Page 274: Ex. 6.8, numbers 20–28 (even)

Lesson 148**Teacher Instructions:**

1. Homework Check.
(*During HW check, students do Practice Exercise 118.*)
2. Turn on the video.

Homework:

Page 272: Ex. 6.7B, numbers 2 and 5–7

Lesson 152**Teacher Instructions:**

1. Homework Check.
(*During HW check, students review section 6.6.*)
2. Turn on the video.

Homework:

Page 274: Ex. 6.8, numbers 30, 32, 34, and 40

Lesson 149**Teacher Instructions:**

1. Homework Check.
(*During HW check, students do Practice Exercise 119.*)
2. Turn on the video.

Homework:

Page 273: Ex. 6.8, numbers 2–10 (even)

Lesson 153**Materials Needed:**

Quiz 48 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(*During HW check, students review sections 6.7–6.8.*)
2. Give, grade, and collect **Quiz 48**.
3. Turn on the video.

Homework:

Study for Test 11 over sections 6.1–6.8 in the next lesson.

Lesson 150**Materials Needed:**

Quiz 47 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(*During HW check, students do Practice Exercise 120.*)
2. Give, grade, and collect **Quiz 47**.
3. Turn on the video.

Lesson 154**Materials Needed:**

Test 11 and Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Announce the homework assignment.
4. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
5. Give **Test 11** over sections 6.1–6.8. Collect and grade tests.
6. Plan to return graded test in les. 155.

Homework:

Read pp. 281–282 and pp. 291–292.

Lesson 155**Materials Needed:**

Graded Test 11 (return to students) and
Test/Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. Hand back and go over graded Test 11. Collect tests and record grades.
3. Turn on the video.

Homework:

Page 275: Ex. 6.9, numbers 1, 4, 6, and 8
Do Construction 24 once.

Lesson 156**Teacher Instructions:**

1. Homework Check.
(During HW check, students inscribe a square and a regular octagon in a circle.)
2. Turn on the video.

Homework:

Page 275: Ex. 6.9, numbers 16 and 17

Lesson 157**Teacher Instructions:**

1. Homework Check.
(During HW check, students review the 45-45-90 triangle relationship.)
2. Turn on the video.

Homework:

Page 276: Ex. 6.9, numbers 22, 23, and 27

Lesson 158**Teacher Instructions:**

1. Homework Check.
(During HW check, students review section 6.9.)
2. Turn on the video.

Homework:

Page 277: Ex. 6.11, numbers 1, 3, and 5
Practice Constructions 26 and 28 once each.

Lesson 159**Teacher Instructions:**

1. Homework Check.
(During HW check, students inscribe a regular hexagon and an equilateral triangle in a circle.)
2. Turn on the video.

Homework:

Page 277: Ex. 6.11, numbers 7, 11, 13, 17, and 18.
For problems 17 and 18, only do the parts pertaining to numbers 7 and 13.

Lesson 160**Teacher Instructions:**

1. Homework Check.
(During HW check, students review theorems 78 through 81 and their corollaries.)
2. Turn on the video.

Homework:

Pages 277–278: Ex. 6.11, numbers 20, 25, 27,
30, and 38
Pages 278–279: Ex. 6.13, numbers 3 and 10

Lesson 161**Materials Needed:**

Quiz 49 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review sections 6.9–6.11.)
2. Give, grade, and collect **Quiz 49**.
3. Turn on the video.

Homework:

Page 279: Ex. 6.14, number 7

Lesson 162**Teacher Instructions:**

1. Homework Check.
(During HW check, students review sections 6.6–6.7.)
2. Turn on the video.

Homework:

Page 280: Ex. 6.15, numbers 10, 11, 14, and 15

Lesson 163**Teacher Instructions:**

1. Homework Check.
(During HW check, students review sections 6.10–6.11.)
2. Turn on the video.

Homework:

Page 287: Ex. 7.2, numbers 37, 38, and 40

Lesson 164**Materials Needed:**

Quiz 50 and Test/Quiz Key

Teacher Instructions:

1. Homework Check.
(During HW check, students review sections 6.10–6.11.)
2. Give, grade, and collect **Quiz 50**.
3. Turn on the video.

Homework:

Page 289: Ex. 7.4, numbers 2, 7, 10, and 15

Lesson 165**Teacher Instructions:**

1. Homework Check.
(During HW check, students review the trigonometry relationships listed on p. 286.)
2. Turn on the video.
Note: Students will take Test 12 (Final Exam) in les. 170. Plan to allow 20–30 minutes extra for this exam. Students should not have more than two major exams in one day.

Homework:

Page 290: Ex. 7.4, numbers 20, 25, and 27

Lesson 166**Teacher Instructions:**

1. Homework Check.
(During HW check, students review pp. 301–306.)
2. Turn on the video.

Homework:

Pages 293–294: Review Les. 1, numbers 2–20 (even)

Lesson 167**Teacher Instructions:**

1. Homework Check.
(During HW check, students review pp. 307–313.)
2. Turn on the video.

Homework:

Pages 294–295: Review Les. 2, numbers 2–20 (even)

Lesson **168****Teacher Instructions:**

1. Homework Check.
(During HW check, students review pp. 314–319.)
2. Turn on the video.

Homework:

Pages 295–296: Review Les. 3, numbers 2–20 (even)

Lesson **169****Teacher Instructions:**

1. Homework Check.
(During HW check, students review pp. 320–321.)
2. Turn on the video.

Homework:

Study for Test 12 (Final Exam) over sections 1.1–6.15 in the next lesson.

Lesson **170****Materials Needed:**

Test 12 (Final Exam) and Test / Quiz Key

Teacher Instructions:

1. There is no written homework to check.
2. There is no video today.
3. Students clear their desks and take out test materials (two clean sheets of paper, one for a cover sheet and one for a check sheet, and two pencils) before tests are distributed.
4. Give **Test 12** over sections 1.1–6.15. Collect and grade tests.

Note: Students will take the Final Exam. Plan to allow 20–30 minutes extra for this exam. Students should not have more than two major exams in one day.

Plane Geometry

Appendix

Appendix

Plane Geometry Practice Exercises Answer Key

Exercise 1

$6 + 9 + 4 + 7 + 3 + 8 = \underline{37}$	$23 + 76 + 59 + 36 = \underline{194}$	$9 + 47 + 16 + 5 + 48 = \underline{125}$
$148 + 69 + 893 + 7 = \underline{1,117}$	$706 + 845 + 19 + 358 = \underline{1,928}$	$45 + 19 + 689 + 683 = \underline{1,436}$
$5 + 8 + \underline{16} + 9 + 3 = 41$	$84 + \underline{18} + 32 + 19 = 153$	$\underline{75} + 689 + 436 = 1,200$
$115 - 98 = \underline{17}$	$1,895 - 793 = \underline{1,102}$	$700 - 516 = \underline{184}$

Exercise 2

$9 \times 8 = \underline{72}$	$12 \times 11 = \underline{132}$	$7 \times \underline{5} = 35$	$11 \times 6 = \underline{66}$	$\underline{9} \times 9 = 81$
$13 \times 7 = \underline{91}$	$56 \times 8 = \underline{448}$	$\underline{3} \times 67 = 201$	$10 \times 98 = \underline{980}$	$13 \times \underline{13} = 169$
$3,459 \times 9 = \underline{31,131}$	$458 \times 11 = \underline{5,038}$	$17 \times 15 = \underline{255}$	$65 \times 24 = \underline{1,560}$	$5,683 \times 8 = \underline{45,464}$
$63 \div 9 = \underline{7}$	$144 \div \underline{12} = 12$	$560 \div 10 = \underline{56}$	$312 \div 24 = \underline{13}$	$\underline{1,000} \div 4 = 250$

Exercise 3

(If the digit immediately to the right of the place being rounded is less than 5, leave the digit being rounded alone. If the digit to the right is 5 or more, add 1 to the digit being rounded. All digits to the right of the one being rounded become 0s.)

Round off to the nearest tens' place.

$578 \ 580$	$174 \ 170$	$1,784 \ 1,780$	$9,783 \ 9,780$
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Round off to the nearest hundreds' place.

$4,893 \ 4,900$	$8,955 \ 9,000$	$7,834 \ 7,800$	$35,759 \ 35,800$
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Round off to the nearest ten thousands' place.

$1,784,785 \ 1,780,000$	$78,899,674 \ 78,900,000$	$90,746,784 \ 90,750,000$
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Round off the answer to the nearest ten dollars.

$\$45 \times 23 \ \$1,040$	$\$23 + \$67 + \$99 \ \190	$\$3,531 - \$477 \ \$3,050$
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Exercise 4

(Remember that a raised dot indicates multiplication. A fraction bar indicates division.)

$16 \cdot 5 = \underline{80}$	$79 + 346 + 789 + 32 = \underline{1,246}$	$\$234 - \$86 = \underline{\$148}$	$694 \cdot 78 = \underline{54,132}$
$\frac{210}{30} = \underline{7}$	$\underline{9} \cdot 12 = 108$	$\frac{63}{7} = 9$	$9 + 57 + 247 + 69 = \underline{382}$

Round off to the digit that is bold.

$5,894 \ 5,900$	$\mathbf{64},845 \ 60,000$	$48,\mathbf{296} \ 48,300$	$1,178,567 \ 1,200,000$
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Exercise 5 (quiz—8 each)

Robert E. Lee had an army of about 75,000 men at the Battle of Gettysburg. To what place is 75,000 rounded? *one thousand*

George Meade led the Union army of about 90,000 at the Battle of Gettysburg. How many more Union soldiers than Confederate soldiers were there? *15,000*

Gen. Lee had about 20 thousand casualties, and Gen. Meade had about 18 thousand. How many more Union soldiers than Confederate soldiers were there at the end of the Battle of Gettysburg? *17,000*

$$\begin{array}{lll} 7 + 8 + 9 + 4 + 6 = 34 & 32 + 28 + 76 = 136 & 132 - 17 = 115 \\ 9 \times 7 = 63 & 27 \times 9 = 243 & 300 - 21 = 279 \\ 96 \div 12 = 8 & 320 \div 10 = 32 & 200 - 74 + 56 = 182 \end{array}$$

$$\begin{array}{r} 90,000 \\ - 75,000 \\ \hline 15,000 \end{array}$$

$$\begin{array}{r} 72,000 \\ - 55,000 \\ \hline 17,000 \end{array}$$

Exercise 6

(Solve within parentheses first. Do multiplication and division in the order they appear. Do addition and subtraction last.)

$$\begin{array}{lll} (12 + 6) \times 5 = 90 & 5 \times (6 + 2) - 5 = 35 & 12 \div 4 \times 2 - 3 = 3 \\ \frac{25}{5} + 8 \times 3 = 29 & 7 \cdot 2 \cdot 5 \div 10 + 4 = 11 & 16 + 4 \div 4 \times 6 - 3 = 19 \\ 12 \times (5 + 4) \div 2 = 54 & (16 - 9) \cdot 5 + 35 = 70 & \frac{20}{5} \cdot 4 - 7 + 6 - 9 = 6 \end{array}$$

Exercise 7

(Division by primes is a good method to find prime factors.)

Write the prime factors.

$$\begin{array}{llll} 25 & 5 \times 5 & 42 & 2 \times 3 \times 7 \\ 56 & 2 \times 2 \times 2 \times 7 & 12 & 2 \times 2 \times 3 \\ 240 & 2 \times 2 \times 2 \times 2 \times 3 \times 5 & 510 & 2 \times 3 \times 5 \times 17 \\ 225 & 3 \times 3 \times 5 \times 5 & 840 & 2 \times 2 \times 2 \times 3 \times 5 \times 7 \end{array}$$

Exercise 8

Write the greatest common factor (gcf) for each set of numbers after the prime factors are found.

$$\begin{array}{llll} 24; 60; 84 & 12 & 45; 150; 175 & 5 \\ 15; 20 & 5 & 12; 36; 72 & 12 \\ 16; 30 & 2 & 18; 24; 36 & 6 \\ 50; 110; 210 & 10 & 9; 15; 27 & 3 \end{array}$$

Exercise 9

(Divide both terms by the gcf to reduce a fraction to lowest terms.)

Reduce to lowest terms.

$$\begin{array}{llllllll} \frac{18}{24} & \frac{3}{4} & \frac{68}{102} & \frac{2}{3} & \frac{24}{36} & \frac{2}{3} & \frac{378}{462} & \frac{9}{11} & \frac{28}{144} & \frac{7}{36} & \frac{110}{176} & \frac{5}{8} & \frac{81}{135} & \frac{3}{5} & \frac{16}{40} & \frac{2}{5} \end{array}$$

Exercise 10

The odometer on Missy's car read 23,678 before her trip. After the trip, it read 25,127. How many miles was her trip? Round off the answer to the nearest ten miles. *1,450*

$$\begin{array}{r} 25,127 \\ -23,678 \\ \hline 1,449 \end{array}$$

The speedometer of a car should be lubricated every 16,000 kilometers. (A) How many times should the speedometer have been lubricated if the car has 68 thousand kilometers? (B) After how many more kilometers should the speedometer be lubricated again? (A) 4 (B) 12,000

$$\begin{array}{r} (A) \quad 4 \\ 16 \overline{)68} \\ \underline{-64} \\ 4 \end{array}$$

$$\begin{array}{r} (B) \quad 16,000 \\ \underline{-4,000} \\ 12,000 \end{array}$$

One city has a policy to give speeders a ticket at the rate of \$29 per mile traveled above the speed limit. When Missy passed through this city she was caught speeding. The officer said that she was going 43 mph in a 35 mph zone. How much was her ticket? *\$232*

$$\begin{array}{r} 43 \quad \$29 \\ -35 \quad \times 8 \\ \hline 8 \quad \$232 \end{array}$$

Exercise 11

Write the least common multiple (lcm) for each set of numbers after the prime factors are found.

6; 8; 12 *24* 3; 4; 5 *60* 8; 12; 18 *72* 6; 9; 15 *90*
 12; 15; 18 *180* 8; 24; 40 *120* 2; 3; 4 *12* 5; 10; 25 *50*

Exercise 12

Write the least common denominator for each set of fractions.

$\frac{2}{15}, \frac{3}{5}, \frac{2}{3}$ *15* $\frac{7}{24}, \frac{2}{3}, \frac{3}{16}$ *48* $\frac{9}{10}, \frac{5}{6}$ *30* $\frac{3}{4}, \frac{5}{8}, \frac{3}{5}$ *40*
 $\frac{27}{42}, \frac{3}{4}, \frac{6}{7}$ *84* $\frac{1}{4}, \frac{1}{5}, \frac{1}{6}$ *60* $\frac{2}{5}, \frac{7}{8}, \frac{1}{3}$ *120* $\frac{1}{4}, \frac{2}{7}$ *28*

Exercise 13

(The greater the denominator of a unit fraction, the less the value.)

Order the fractions from least to greatest.

$\frac{1}{2}, \frac{1}{5}, \frac{3}{8}, \frac{1}{3}$ $\frac{1}{5}, \frac{1}{3}, \frac{3}{8}, \frac{1}{2}$ $\frac{1}{6}, \frac{3}{4}, \frac{1}{9}, \frac{1}{5}$ $\frac{1}{9}, \frac{1}{6}, \frac{1}{5}, \frac{3}{4}$ $\frac{2}{7}, \frac{5}{7}, \frac{1}{7}, \frac{8}{7}$ $\frac{1}{7}, \frac{2}{7}, \frac{5}{7}, \frac{8}{7}$ $\frac{1}{4}, \frac{5}{8}, \frac{2}{3}, \frac{1}{8}$ $\frac{1}{8}, \frac{1}{4}, \frac{5}{8}, \frac{2}{3}$
 $\frac{1}{4}, \frac{1}{8}, \frac{1}{2}, \frac{1}{6}$ $\frac{1}{8}, \frac{1}{6}, \frac{1}{4}, \frac{1}{2}$ $\frac{3}{8}, \frac{5}{6}, \frac{1}{4}, \frac{1}{2}$ $\frac{1}{4}, \frac{3}{8}, \frac{1}{2}, \frac{5}{6}$ $\frac{3}{4}, \frac{7}{8}, \frac{2}{3}, \frac{5}{6}$ $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8}$ $\frac{5}{8}, \frac{1}{5}, \frac{1}{9}, \frac{1}{6}$ $\frac{1}{9}, \frac{1}{6}, \frac{1}{5}, \frac{5}{8}$

Exercise 14 (quiz—9 each)

$$3,000 - 478 = 2,522 \qquad 578 \times 63 = 36,414 \qquad 30,444 \div 86 = 354$$

Round off to the digit that is bold.

$$9,374 \quad 9,400 \qquad 89,247 \quad 90,000 \qquad 453,285 \quad 453,290 \qquad 3,958,105 \quad 4,000,000$$

Reduce to lowest terms.

$$\frac{12}{18} \frac{2}{3} \qquad \frac{48}{60} \frac{4}{5} \qquad \frac{120}{150} \frac{4}{5} \qquad \frac{128}{200} \frac{16}{25}$$

Exercise 15

Betelgeuse, a supergiant star, has a diameter that is 330 times the diameter of the sun. The diameter of the sun is 865,000 miles. Find the diameter of Betelgeuse. *285,450,000 mi.*

$$\begin{array}{r} 865,000 \\ \times 330 \\ \hline 25950000 \\ +2595000 \\ \hline 285,450,000 \end{array}$$

The smallest white star has a diameter of 5,200 miles. To the nearest whole number, how many times will this small star fit inside the sun? *166*

$$\begin{array}{r} 865,000 \\ 5,200 \overline{)8650} \\ \underline{5200} \\ 3450 \\ \underline{3120} \\ 330 \\ \underline{312} \\ 18 \end{array}$$

Light travels at a speed of 186,282 miles per second. Round off its speed to the nearest ten thousand miles. *190,000 mps*

The temperature of a red star is about 5,000 °F. The temperature of a blue star is about 50,000 °F. How many times hotter is a blue star than a red star? *10*

$$\begin{array}{r} 50,000 \\ 5,000 \overline{)50,000} \\ \hline 10 \end{array}$$

Exercise 16

(Fractions must have a common denominator to be added or subtracted.)

$$\begin{array}{lll} \frac{3}{4} + \frac{2}{3} + \frac{1}{6} = 1\frac{7}{12} & 5\frac{3}{5} + 16\frac{1}{2} + 8\frac{1}{4} = 30\frac{7}{20} & 15\frac{5}{9} + 3\frac{2}{9} + 2\frac{5}{9} = 21\frac{1}{3} \\ 5\frac{1}{2} + 7\frac{3}{4} + 18\frac{5}{6} = 32\frac{1}{12} & 14\frac{3}{8} + 7\frac{5}{6} + 2\frac{5}{12} = 24\frac{5}{8} & 9\frac{3}{8} + 7\frac{1}{4} + 12\frac{1}{2} = 29\frac{1}{8} \end{array}$$

Exercise 17

$$\begin{array}{lll} \frac{11}{12} - \frac{7}{15} = \frac{9}{20} & \frac{8}{9} - \frac{2}{3} = \frac{2}{9} & 23\frac{5}{9} - 16\frac{3}{5} = 6\frac{43}{45} \\ 1\frac{1}{2} - \frac{3}{4} = \frac{3}{4} & 12\frac{3}{8} - 8\frac{5}{6} = 3\frac{13}{24} & 10\frac{5}{9} - 7\frac{2}{3} = 2\frac{8}{9} \end{array}$$

Exercise 18

(Cancel common factors before multiplying when possible.)

$$\frac{7}{8} \times \frac{4}{5} = \frac{7}{10}$$

$$\frac{17}{20} \times \frac{4}{9} = \frac{17}{45}$$

$$\frac{2}{3} \times \frac{4}{15} = \frac{8}{45}$$

$$\frac{9}{11} \times \frac{7}{12} = \frac{21}{44}$$

$$10 \times \frac{2}{9} = 2\frac{2}{9}$$

$$\frac{5}{8} \times 12 = 7\frac{1}{2}$$

$$\frac{7}{9} \times 15 = 11\frac{2}{3}$$

$$24 \times \frac{11}{12} = 22$$

$$\frac{2}{3} \times 1\frac{1}{2} = 1$$

$$\frac{5}{8} \times 3\frac{1}{5} = 2$$

$$9 \times 4\frac{1}{5} = 37\frac{4}{5}$$

$$2\frac{4}{9} \times 12 = 29\frac{1}{3}$$

$$1\frac{1}{3} \times \frac{5}{6} = 1\frac{1}{9}$$

$$\frac{1}{4} \times 2\frac{2}{3} = \frac{2}{3}$$

$$2\frac{3}{5} \times \frac{5}{6} = 2\frac{1}{6}$$

$$\frac{5}{6} \times 3\frac{1}{3} = 2\frac{7}{9}$$

$$3\frac{1}{3} \times 2\frac{1}{2} = 8\frac{1}{3}$$

$$2\frac{3}{4} \times 1\frac{1}{3} = 3\frac{2}{3}$$

$$3\frac{2}{3} \times 2\frac{1}{5} = 8\frac{1}{15}$$

$$2\frac{7}{8} \times 4\frac{3}{5} = 13\frac{9}{40}$$

Exercise 19

$$\frac{3}{5} \div \frac{9}{10} = \frac{2}{3}$$

$$\frac{6}{7} \div \frac{3}{4} = 1\frac{1}{7}$$

$$12 \div \frac{2}{9} = 54$$

$$\frac{3}{4} \div 15 = \frac{1}{20}$$

$$\frac{3}{8} \div 10 = \frac{3}{80}$$

$$12 \div \frac{1}{2} = 24$$

$$\frac{4}{5} \div \frac{15}{16} = \frac{64}{75}$$

$$\frac{9}{11} \div \frac{2}{3} = 1\frac{5}{22}$$

$$1\frac{1}{3} \div 5 = \frac{4}{15}$$

$$\frac{7}{8} \div 16 = \frac{7}{128}$$

$$12\frac{1}{2} \div \frac{3}{5} = 20\frac{5}{6}$$

$$1\frac{3}{5} \div 2\frac{2}{7} = \frac{7}{10}$$

Exercise 20

Jordan feeds her dog $4\frac{1}{3}$ cups of dry dog food each day. She gives $2\frac{1}{2}$ cups in the morning and the rest in the evening. How many cups of dog food does she give her dog in the evening?

$$1\frac{5}{6} \text{ c.}$$

$$\begin{array}{r} 4\frac{1}{3} = 4\frac{2}{6} = 3\frac{8}{6} \\ - 2\frac{1}{2} = -2\frac{3}{6} = -2\frac{3}{6} \\ \hline 1\frac{5}{6} \text{ c.} \end{array}$$

A bag of dog food lasts Jordan's dog 12 days. How many cups of dog food does the bag contain? 52 c.

$$\begin{array}{r} 4\frac{1}{3} \times 12 \\ \frac{13}{1} \times \frac{12}{1} = 52 \text{ c.} \end{array}$$

Mike's dog eats 2 cups less than twice as much as Jordan's dog. How many cups of dog food does Mike's dog eat each day?

$$6\frac{2}{3} \text{ c.}$$

$$\begin{array}{r} 4\frac{1}{3} \times 2 \\ \frac{13}{3} \times \frac{2}{1} = \frac{26}{3} = 8\frac{2}{3} - 2 = 6\frac{2}{3} \text{ c.} \end{array}$$

Mike's dog weighs $61\frac{1}{2}$ pounds. Jordan's dog weighs $48\frac{7}{8}$ pounds. How many more pounds does Mike's dog weigh than Jordan's dog?

$$12\frac{5}{8} \text{ lb.}$$

$$\begin{array}{r} 61\frac{1}{2} = 61\frac{4}{8} = 60\frac{12}{8} \\ - 48\frac{7}{8} = -48\frac{7}{8} = -48\frac{7}{8} \\ \hline 12\frac{5}{8} \text{ lb.} \end{array}$$

Exercise 21

(Remember, only like place values may be added or subtracted. For instance, tenths can be added only to tenths.)

$$135.7 + 423.9 = 559.6$$

$$123.89 + 79.95 = 203.84$$

$$45.097 - 7.895 = 37.202$$

$$5.6 - 4.2 = 1.4$$

$$6.09 - 3.896 = 2.194$$

$$34.896 + 5.7 + 2.367 = 42.963$$

$$2.467 + 6.7 - 1.56 = 7.607$$

$$13.907 - 7.89 + 5.789 = 11.806$$

$$2.786 + 8.905 + 4.7 = 16.391$$

Exercise 22

Round to the nearest tenth.

.8943 *.9* 2.854 *2.9* 16.7334 *16.7* 4.801 *4.8*

Round to the nearest cent.

\$.907 *\$.91* \$16.473 *\$16.47* \$3.995 *\$4.00* \$50.947 *\$50.95*

Round the answer to the nearest tenth.

$27.893 + 8.6 - 2.55 = 33.9$ $45.983 - .8674 + 159.7 = 204.8$ $23.895 + .37 + 56.9 = 81.2$

Exercise 23

(The product has as many decimal places as the factors combined. To multiply by a positive power of 10, move the decimal point to the right as many places as there are 0s in the power of 10.)

$8.165 \times .3 = 2.4495$ $2.79 \times .001 = .00279$ $19.254 \times .8 = 15.4032$
 $.56 \times 2.5 = 1.4$ $1.386 \times 100 = 138.6$ $1,000 \times 5.8943 = 5,894.3$

Round the answer to the nearest cent.

$\$5.254 \times .3 = \1.58 $\$17.894 \times 15 = \268.41 $67.9¢ \times .61 = \$.41$ or *41¢*

Exercise 24

(To divide by a positive power of 10, move the decimal point to the left as many places as there are 0s in the power of 10. If the divisor has a decimal, multiply both terms by the power of 10 that eliminates the decimal from the divisor.)

$.087 \div 100 = .00087$ $2.457 \div 10 = .2457$ $.918 \div 3.4 = .27$
 $2.24 \div .04 = 56$ $247 \div 32.5 = 7.6$ $.0287 \div .007 = 4.1$

Round the answer to the nearest tenth of a cent.

$\$5.20 \div 3 = \1.73 $\$12.88 \div 11 = \1.17 $\$.76 \div 7 = \$.11$

Exercise 25

George Mikan, who played for the Lakers from 1947 to 1956, scored 11,764 points. If this was an average of 22.6 points per game, find the number of games he played for the Lakers to the nearest whole game.

521

$$22.6 \overline{) 11,764.00} = 521$$

While playing for the Chicago Bulls during the 1986 to 1987 season, Michael Jordan scored an average of 37.1 points per game. How many more points per game did he average than George Mikan?

14.5

$$\begin{array}{r} 37.1 \\ -22.6 \\ \hline 14.5 \end{array}$$

George Mikan was 208 centimeters tall. If 1 cm equals .39 in., find his height in feet and inches. Find the inches to the nearest whole inch. (1 ft. = 12 in.) *6 ft. 9 in.*

$$\begin{array}{r} 208 \\ \times .39 \\ \hline 1872 \\ +624 \\ \hline 81.12 \end{array} \quad \begin{array}{r} 12 \overline{) 81.12} \\ \underline{67.6} \\ 13.52 \\ \underline{12} \\ 1.12 \\ \underline{1.12} \\ 0 \end{array} \quad \begin{array}{r} \times .76 \\ 72 \\ \hline +84 \\ \hline 9.12 \end{array}$$

Michael Jordan is 6 ft. 6 in. tall. If 1 in. equals 2.54 cm, find his height in centimeters. Find the answer to the nearest whole centimeter.

198 cm

$$\begin{array}{r} 12 \times 6 = 72 \\ +6 \\ \hline 78 \end{array} \quad \begin{array}{r} 2.54 \\ \times 78 \\ \hline 2032 \\ 1778 \\ \hline 198.12 \end{array}$$

Exercise 26

$$\begin{array}{lll} 68\frac{3}{14} - 33\frac{1}{42} = 35\frac{4}{21} & 12\frac{3}{5} + 92\frac{1}{2} + 63\frac{3}{4} = 168\frac{17}{20} & 31\frac{1}{2} \div \frac{3}{4} = 42 \\ 5\frac{6}{7} \times \frac{14}{41} = 2 & 444.54 \div 23.9 = 18.6 & 46.5 - 39.732 = 6.768 \\ 34.6 \times .005 = .173 & 3.45 + 3.896 + 236.89 = 244.236 & 4,783.2 \div 1,000 = 4.7832 \end{array}$$

Exercise 27 (quiz—8 each)

$$\begin{array}{lll} 5\frac{3}{8} + 7\frac{5}{12} = 12\frac{19}{24} & 11\frac{4}{9} - 7\frac{2}{3} = 3\frac{7}{9} & 1\frac{1}{2} \div \frac{3}{4} = 2 \\ .07 \times .63 = .0441 & 6\frac{2}{5} \times \frac{15}{16} = 6 & 4.78 + 2.64 + 7.995 = 15.415 \\ 34.6 \div 10 = 3.46 & 3.06 - 1.7328 = 1.3272 & 176.8 \div 5.2 = 34 \\ 10 - \frac{1}{2} = 9\frac{1}{2} & 3\frac{2}{3} + 1\frac{1}{4} = 4\frac{11}{12} & 1\frac{1}{4} \times 8 = 10 \end{array}$$

Exercise 28

(To convert from a larger unit to a smaller unit, multiply by the number of smaller units in 1 larger unit. To convert from a smaller unit to a larger unit, divide.)

$$\begin{array}{llll} 40 \text{ ft.} = \underline{480} \text{ in.} & 612 \text{ fl. oz.} = \underline{76\frac{1}{2}} \text{ c.} & 53 \text{ da.} = \underline{7\frac{4}{7}} \text{ wk.} & 5.4 \text{ mi.} = \underline{28,512} \text{ ft.} \\ 8.8 \text{ lb.} = \underline{140.8} \text{ oz.} & 36 \text{ qt.} = \underline{9} \text{ gal.} & 5\frac{3}{4} \text{ yr.} = \underline{69} \text{ mo.} & 9 \text{ tbsp.} = \underline{27} \text{ tsp.} \end{array}$$

Round the answer to the nearest tenth.

$$133 \text{ min.} = \underline{2.2} \text{ hr.} \quad 27 \text{ in.} = \underline{2.3} \text{ ft.} \quad 300 \text{ fl. oz.} = \underline{9.4} \text{ qt.} \quad 520 \text{ oz.} = \underline{32.5} \text{ lb.}$$

Exercise 29

(Since the metric system is based upon 10, multiply or divide by moving the decimal point to the right or left.)

$$\begin{array}{llll} 9.8 \text{ kl} = \underline{98,000} \text{ dl} & 5,000 \text{ g} = \underline{500} \text{ dkg} & 514 \text{ hm} = \underline{51.4} \text{ km} & 90 \text{ cm} = \underline{900} \text{ mm} \\ 7,193 \text{ mg} = \underline{.07193} \text{ hg} & 52 \text{ m} = \underline{5,200} \text{ cm} & 2,250 \text{ m} = \underline{2.25} \text{ km} & 0.8 \text{ kg} = \underline{80,000} \text{ cg} \end{array}$$

Exercise 30

A migrating duck can fly about 11,000 kilometers per week.

Find the average number of meters per day the migrating duck can fly. Round to the nearest whole meter.

$$1,571,429 \text{ m}$$

Car A leaves a destination at 3 P.M. and travels 60 kph. Car B leaves the same destination and travels the same route as Car A at 4 P.M. and travels 70 kph. At what time will Car B catch up to Car A? *10:00 P.M.*

$$\begin{array}{r} 1,571.4285 = 1,571,429 \text{ m} \\ 7 \overline{) 11,000.0000} \end{array}$$

	Car A	Car B
4 P.M.	60 km	
5 P.M.	120 km	70 km
6 P.M.	180 km	140 km
7 P.M.	240 km	210 km
8 P.M.	300 km	280 km
9 P.M.	360 km	350 km
10 P.M.	420 km	420 km

A horse ran at the rate of 900 ft./min. At that rate, how many miles to the nearest whole mile did the horse run in 1 hour?

$$10 \text{ mph}$$

$$\begin{array}{r} 900 \\ \times 60 \\ \hline 54,000 \text{ ft. / hr.} \end{array}$$

$$\frac{54,000}{5,280} = \frac{1,350}{132} = \frac{675}{66} = \frac{225}{22} \quad 22 \overline{) 10.2} = 10 \text{ mi.}$$

Exercise 31

Write each fraction as a decimal. If necessary, round to the nearest thousandth.

$$\frac{798}{1,000} .798 \quad \frac{5}{8} .625 \quad 29\frac{3}{4} 29.75 \quad \frac{69}{217} .318 \quad 89\frac{1}{8} 89.125 \quad \frac{25}{100} .25$$

$$\frac{723}{14,681} .049 \quad 103\frac{1}{2} 103.5 \quad \frac{24}{47} .511 \quad \frac{284}{10,000} .028 \quad \frac{5}{6} .833 \quad \frac{1}{9} .111$$

Exercise 32

Write each decimal as a fraction in lowest terms.

$$.875 \frac{7}{8} \quad .75 \frac{3}{4} \quad .938 \frac{469}{500} \quad .125 \frac{1}{8} \quad .25 \frac{1}{4} \quad .818 \frac{409}{500}$$

$$.35 \frac{7}{20} \quad .465 \frac{93}{200} \quad .52 \frac{13}{25} \quad .8 \frac{4}{5} \quad .545 \frac{109}{200} \quad .382 \frac{191}{500}$$

Exercise 33

(To write a percent as a decimal, move the decimal point 2 places to the left and delete the percent sign.)

Write each percent as a decimal.

$$61\% .61 \quad 3\% .03 \quad 6\frac{1}{2}\% .065 \quad 568\% 5.68 \quad \frac{3}{4}\% .0075 \quad 456\frac{7}{8}\% 4.56875$$

(To write a decimal as a percent, move the decimal point 2 places to the right and use the percent sign.)

Write each decimal as a percent.

$$.35 35\% \quad .007 .7\% \quad 4.5 450\% \quad .745 74.5\% \quad .0003 .03\% \quad 25.4 2,540\%$$

Write each percent as a fraction in lowest terms.

$$25\% \frac{1}{4} \quad 33\frac{1}{3}\% \frac{1}{3} \quad 16\frac{1}{6}\% \frac{1}{6} \quad 37\frac{1}{2}\% \frac{3}{8} \quad 40\% \frac{2}{5} \quad 50\% \frac{1}{2}$$

Exercise 34

Estimate the answer by rounding the terms to the nearest whole numbers. Answers should be rounded to nearest whole number also.

$$13.23 \times 5.9 = 78 \quad \$799.85 \times 9.1 = \$7,200 \quad 572.9 \times 5.2 \times 7.9 = 22,920$$

$$2,351.11 \div 9.9 = 235 \quad \$399.99 \div 0.87 = \$400 \quad 24.91 \div 5.06 \times 19.86 = 100$$

$$5.2 \times 6.9 \times 3.8 = 140 \quad 27.8 \div 3.9 = 7 \quad 631.2 \times 9.999 \div 99.9 = 63$$

Exercise 35

How many fluid ounces of fruit juice are in a punch containing 8 + 16 + 64 + 6 = 94 fl. oz. 1 cup of lemon juice, 1 pint of pineapple juice, 2 quarts of orange juice, and $\frac{3}{4}$ cup of grapefruit juice? 94 fl. oz.

Mrs. Nelson bought 5 packages of chips. Each bag contained 14 oz. What was the total weight of the 5 bags? Give your answer in pounds and ounces. 4 lb. 6 oz.

$$\begin{array}{r} 14 \text{ oz.} \\ \times 5 \\ \hline 70 \text{ oz.} \end{array} \quad \begin{array}{r} 16 \text{ lb.} \\ \times 2 \\ \hline 32 \text{ lb.} \end{array} \quad \begin{array}{r} 64 \text{ qt.} \\ \times 2 \\ \hline 128 \text{ qt.} \end{array} = 4 \text{ lb. } 6 \text{ oz.}$$

A package of 16 hot dogs weighs 2 lb. 8 oz. What is the weight of each hot dog? Give your answer in ounces. 2.5 oz.

$$\begin{array}{r} 2 \text{ lb. } 8 \text{ oz.} \\ \div 16 \\ \hline 2 \text{ lb. } 8 \text{ oz.} \\ -32 \text{ oz.} \\ \hline 40 \text{ oz.} \\ -32 \\ \hline 8 \text{ oz.} \\ -80 \\ \hline 0 \end{array}$$

Jenny invited 64 students to her fall party. Five-eighths of the students were able to come. If Jenny supplied 20 fluid ounces of fruit punch for each student who came, how many quarts of drink did she need?

25 qt.

$$\begin{array}{r} 64 \\ \times \frac{5}{8} \\ \hline 40 \end{array} \quad \begin{array}{r} 20 \\ \times 40 \\ \hline 800 \end{array} = 800 \text{ fl. oz.} \quad \begin{array}{r} 800 \\ \div 32 \\ \hline 25 \end{array} \text{ qt.}$$

Exercise 36

(To find a percentage, multiply the base by the percent written as a decimal.)

$$6\% \text{ of } 810 = 48.6 \quad 25\% \text{ of } 440 = 110 \quad 85\% \text{ of } 90 = 76.5$$

$$1\frac{1}{2}\% \text{ of } 750 = 11.25 \quad 225\% \text{ of } 60 = 135 \quad \frac{3}{4}\% \text{ of } 975 = 7.3125$$

$$\frac{4}{5}\% \text{ of } 600 = 4.8 \quad 15\% \text{ of } \$26.50 = \$3.98 \quad 33\frac{1}{3}\% \text{ of } 120 = 40$$

Exercise 37

(To find a percent, divide the percentage by the base.)

If necessary, round to the nearest whole percent.

$$12 \text{ is what } \% \text{ of } 48? \quad 25\% \quad 200 \text{ is what } \% \text{ of } 450? \quad 44\% \quad 75 \text{ is what } \% \text{ of } 120? \quad 63\%$$

$$3 \text{ is what } \% \text{ of } 21? \quad 14\% \quad 22 \text{ is what } \% \text{ of } 77? \quad 29\% \quad 15 \text{ is what } \% \text{ of } 90? \quad 17\%$$

$$43 \text{ is what } \% \text{ of } 78? \quad 55\% \quad 85 \text{ is what } \% \text{ of } 100? \quad 85\% \quad 5 \text{ is what } \% \text{ of } 20? \quad 25\%$$

Exercise 38

(To find the base, divide the percentage by the percent written as a decimal.)

$$16 \text{ is } 8\% \text{ of what number? } 200 \quad 30 \text{ is } 60\% \text{ of what number? } 50$$

$$9 \text{ is } 15\% \text{ of what number? } 60 \quad 21 \text{ is } 10\frac{1}{2}\% \text{ of what number? } 200$$

$$6 \text{ is } 50\% \text{ of what number? } 12 \quad 127 \text{ is } 25\% \text{ of what number? } 508$$

Exercise 39 (quiz—8 each)

$$9\frac{1}{4}\% \text{ of } 50 = 4.625 \quad 11 \text{ is } 5\% \text{ of what number? } 220 \quad 60 \text{ is } 120\% \text{ of what number? } 50$$

$$14 \text{ is what } \% \text{ of } 28? \quad 50\% \quad 16\frac{1}{2}\% \text{ of } 80 = 13.2 \quad 25 \text{ is what } \% \text{ of } 1,000? \quad 2.5\%$$

$$19\% \text{ of } \$650 = \$123.50 \quad 5\frac{1}{5}\% \text{ of } \$750 = \$39 \quad \frac{3}{8}\% \text{ of } 2,000 = 7.5$$

$$5\% \text{ of } \$800 = \$40 \quad 10\% \text{ of } \$550 = \$55 \quad 25\% \text{ of } \$100 = \$25$$

Exercise 44

Just by looking at the top row, identify the calculations that are wrong.

$6.34 \times 8.91 = 5.64894$ <i>wrong</i>	$25.09 \times 2.8 = 70.252$	$5.8 \times .45 = .261$ <i>wrong</i>
14% of 980 = 137.2	78 is 20% of what number? 390	12 is 75% of what number? 16
15 is what % of 50? 30%	$99\frac{1}{2}\%$ of 6,000 = 5,970	30 is what % of 20? 150%
38% of \$785 = \$298.30	$12\frac{1}{5}\%$ of \$25,500 = \$3,111	$1\frac{1}{4}\%$ of 20,000 = 250

Exercise 45

Heather cared for the Turner triplets for $5\frac{1}{4}$ hours at the rate of \$4 per hour. How much did she earn? \$21

Heather spent $\frac{2}{3}$ of the money that she earned caring for the triplets and then lost $\frac{3}{4}$ of the money that she had left. How much money does Heather still have? \$1.75

The money that Heather has left is in nickels and dimes. She had 5 more nickels than dimes. How many of each coin does she have?
10 dimes and 15 nickels

Heather gave all the money that she had left to her Sunday school class. What percent of the money that she earned did she give? Find the answer to the nearest whole percent.

$$5\frac{1}{4} \times \$4 = \$21$$

$$\frac{21}{1} \times \frac{1}{1} = \$21$$

$$\frac{2}{3} \times \$21 = \$14 \quad \$7.00$$

$$\frac{3}{4} \times \frac{\$7}{1} = \frac{21}{4} = \$5.25 \quad \frac{-5.25}{\$1.75}$$

$$x = \text{dimes (10)}$$

$$x + 5 = \text{nickels (15)}$$

$$.1x + .05(x + 5) = 1.75$$

$$.1x + .05x + .25 = 1.75$$

$$10x + 5x + 25 = 175$$

$$x = 10$$

$$8\% \quad \$1.75 \text{ is what \% of } \$21 \quad \frac{.083}{21} = 8\%$$

Exercise 46

(To find interest, use the simple interest formula, ***i = prt***. *i* = interest; *p* = principal; *r* = rate written as a decimal; *t* = time in years)

Find the simple interest.

$p = \$925; r = 13\%; t = 1 \text{ yr. } \120.25	$p = \$1,000; r = 12\frac{5}{8}\%; t = 9 \text{ mo. } \94.69
$p = \$3,200; r = 16\frac{1}{2}\%; t = 2 \text{ yr. } \$1,056$	$p = \$16,000; r = 6\frac{3}{4}\%; t = 5 \text{ yr. } \$5,400$
$p = \$1,460; r = 11\%; t = 3 \text{ mo. } \40.15	$p = \$500; r = 13\frac{1}{4}\%; t = 6 \text{ mo. } \33.13

Exercise 47

(Since speed is the distance covered in a unit of time, it can be expressed by the ratio, speed = $\frac{\text{distance}}{\text{time}}$. The formula ***s = \frac{d}{t}*** is often used to show the relationship.)

Find the speed.

152 mi. in 4 hr. 38 mph	860 mi. in 2 hr. 430 mph	1,764 mi. in 36 hr. 49 mph
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Find the distance.

45 mph for 3 hr. 135 mi.	630 mph for $1\frac{1}{2}$ hr. 945 mi.	54 mph for 11 hr. 594 mi.
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Find the time.

560 mph for 4,760 mi. $8\frac{1}{2}$ hr.	54 mph for 27 mi. $\frac{1}{2}$ hr.	437 mph for 1,748 mi. 4 hr.
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Exercise 48

(Remember, whatever is done to one side of the equation must be done to the other side.)

Solve for x .

$$x + 5 = \frac{20}{2} \quad 5$$

$$x + 6 = 20 + 5 \quad 19$$

$$6x + 2\frac{1}{2} = 14\frac{1}{2} \quad 2$$

$$x - 3 = 12 \quad 15$$

$$\frac{1}{2}x = 3 \quad 6$$

$$\frac{x}{6} = 18 \quad 108$$

$$3x = 9 \quad 3$$

$$5x = 25 - 10 \quad 3$$

$$\frac{2}{3}x = 12 - 4 \quad 12$$

Exercise 49

Solve for x .

$$6x - 3x = 12 \quad 4$$

$$3x - 5 = x + 3 \quad 4$$

$$\frac{1}{2}x + \frac{1}{5}x = 14 \quad 20$$

$$2.5x + 1.0x = 7 \quad 2$$

$$5x = 4 + x \quad 1$$

$$\frac{2}{3}x = \frac{1}{2} \quad \frac{3}{4}$$

$$3x - 2x + 4 = \frac{15}{3} \quad 1$$

$$4x + 7 = 2x + 17 \quad 5$$

$$.5x = 10 \quad 20$$

Exercise 50

In 1990, the population of a city was 500,000. From 1991 to 1992, the population increased 5% both years. From 1993 to 1996, the population decreased 20% each year. What was the population at the end of 1996?

225,792

$$\begin{array}{r} 500,000 \quad 525,000 \quad 551,250 \\ \times .05 \quad \times .05 \quad \times .8 \\ \hline 25,000.00 \quad 26,250.00 \quad 441,000.0 \\ \hline 441,000 \quad 352,800 \quad 282,240 \\ \times .8 \quad \times .8 \quad \times .8 \\ \hline 352,800.0 \quad 282,240.0 \quad 225,792.0 \end{array}$$

In 1990, 225,000 of the population was under the age of 18. What percent of the population was under 18? 45%

$$\frac{225,000}{500,000} = \frac{45}{100} = 45\%$$

Sixty percent of the 225,000 attended a public education program. An average of \$8,800 was spent per child on education. How much was spent on education in that city? Round the answer to the nearest hundred million. 1,200,000,000

$$\begin{array}{r} 225,000 \quad 135,000 \\ \times .6 \quad \times 8,800 \\ \hline 135,000.0 \quad 10800000 \\ \hline 1,188,000,000 = \\ 1,200,000,000 \end{array}$$

Exercise 51

(The absolute value of a number is the distance that number is from the reference point. Distance cannot be negative. For instance, both -4 and $+4$ are 4 units away from 0 on the number line. Therefore, $|-4|$ and $|+4|$ are 4. Parallel bars around a signed number indicate absolute value.)

Give the absolute value.

$$|-16| \quad 16 \quad | +9 | \quad 9 \quad | 19 | \quad 19 \quad | -23 | \quad 23 \quad | +5 | \quad 5 \quad | -100 | \quad 100$$

$$15\text{-yard loss in football} \quad 15 \quad 1,200 \text{ feet above sea level} \quad 1,200 \quad 12^\circ\text{F. below zero} \quad 12$$

$$\text{gross profit of } \$25 \quad 25 \quad \$100 \text{ withdrawn from bank} \quad 100 \quad \text{loss of } \$12 \quad 12$$

Exercise 52

(When comparing signed numbers, picture a number line. The number to the right on the number line is greater than the number to the left.)

Write > (greater than) or < (less than).

$-8 < -6$

$72 > -89$

$14 < 17$

$0 > -3$

$-15 > -21$

$-12 < 10$

$|-6| > |-7|$

$|15| < |-20|$

$|-9| > |+6|$

Solve for x .

$2x - 6 = 18 \quad 12$

$.4x = 2.4 \quad 6$

$\frac{2x}{3} = 4 \quad 6$

$3x + 9 = 2x + 24 \quad 15$

$5x + 4 = 24 \quad 4$

$3(x + 7) = 51 \quad 10$

Exercise 53

(When addends have the same sign, add and keep the sign. When addends have opposite signs, subtract and keep the sign of the addend with the greater absolute value.)

$(+9) + (+7) = 16$

$(-6) + (-8) = -14$

$(-23) + (+18) = -5$

$(-5) + (-12) = -17$

$(+7) + (-8) = -1$

$(-12) + (+6) = -6$

(In algebra, subtraction is adding the inverse. That means, change the sign of the subtrahend and follow the rules for addition.)

$(18) - (+18) = 0$

$(25) - (+6) = 19$

$(-52) - (-14) = -38$

$(23) - (-8) = 31$

$(-12) - (+5) = -17$

$(15) - (10) = 5$

$(+16) + (-8) + (-7) + (+12) + (-17) = -4$

$(-5) - (-3) + (-8) - (-6) + (-5) = -9$

Exercise 54

(When factors have the same sign, the product is positive. When the signs are opposite, the product is negative. Zero is neither negative nor positive.)

$(-6) \times (-4) = 24$

$(-8) \times (3) = -24$

$(6) \times (12) = 72$

$(-11) \times (4) = -44$

$(-3) (0) (+4) (-8) (-5) 0$

$(-6) (+5) (+4) (-3) (-2) (+1) -720$

(When the dividend and divisor have the same sign, the quotient is positive. When the signs are opposite, the quotient is negative.)

$\frac{28}{4} 7 \quad \frac{-18}{6} -3 \quad \frac{25}{-5} -5 \quad \frac{-42}{-7} 6 \quad \frac{56}{8} 7 \quad \frac{-48}{6} -7$

$\frac{-72}{-9} 8 \quad \frac{14}{-2} -7 \quad \frac{-54}{6} -9 \quad \frac{-35}{-7} 5 \quad \frac{36}{3} 12 \quad \frac{-48}{-12} 4$

Exercise 55

(Use a letter to **represent** the unknown number. If more than one number is to be found, use a letter to represent one of the numbers and represent all other numbers in terms of that letter. **Form** an equation from the information given in the problem using the letter or letters that represent the unknown numbers. **Solve** the equation.)

Four times a certain number is 92. What is the number? $4x = 92$
 $4x = 92; x = 23$ $\frac{4x}{4} = \frac{92}{4}$ $x = 23$ $7x = 266$
 $\frac{7x}{7} = \frac{266}{7}$ $x = 38$ $x + 2x = 24$
 $7x = 266; x = 38$ $x + 15 = 41$ $3x = 24$
 The sum of a certain number and 15 is 41. What is the number? $x + 15 = 41$
 $x + 15 - 15 = 41 - 15$ $x = 26$ $\frac{3x}{3} = \frac{24}{3}$
 $x + 15 = 41; x = 26$ $x = 26$ $x = 8$
 Separate the number 24 into two parts so that one number is twice the other number. $2x = 16$

$x + 2x = 24; x = 8; 2x = 16$
 If 5 times a number is decreased by 12, the result is 108. What is the number? $5x - 12 = 108 + 12$
 $5x - 12 + 12 = 108 + 12$
 $5x - 12 = 108; x = 24$ $5x = 120$
 Three less than three times a number is 45. What is the number? $3x - 3 = 45$
 $3x - 3 = 45; x = 16$ $\frac{3x - 3}{3} = \frac{120}{3}$ $3x - 3 = 45$
 $3x - 3 + 3 = 45 + 3$
 Lynn is 4 years younger than her sister Tobbe. If the sum of their ages is 18, how old are Lynn and Tobbe? $x + x - 4 = 18$
 $x + x - 4 + 4 = 18 + 4$ $2x = 22$ $x = 24$ $3x = 48$
 $x + x - 4 = 18; x = 11; x - 4 = 7$ $\frac{2x}{2} = \frac{22}{2}$ $\frac{3x}{3} = \frac{48}{3}$ $x = 16$
 $x = 11$ $x - 4 = 7$

Exercise 56

(In a proportion, the product of the means should equal the product of the extremes.)

Solve for x .

$$\frac{3}{8} = \frac{12}{x} \quad 32 \qquad \frac{4}{6} = \frac{x}{12} \quad 8 \qquad \frac{5}{11} = \frac{9}{x} \quad 19.8 \qquad \frac{7}{8} = \frac{x}{16} \quad 14$$

$$\frac{x}{5} = \frac{10}{12} \quad 4.\overline{16} \qquad \frac{4}{9} = \frac{7}{x} \quad 15.75 \qquad \frac{2}{7} = \frac{x}{21} \quad 6 \qquad \frac{3}{5} = \frac{9}{x} \quad 15$$

Exercise 57

(When evaluating algebraic expressions, remember to use the correct order of operations after proper substitutions have been made.)

Simplify if $x = 5$ and $y = 4$.

$$x + y = 9 \qquad xy = 20 \qquad 5xy = 100 \qquad 2x + 3y - xy = 2$$

Simplify if $a = -2$, $b = 3$, and $x = 4$.

$$abx = -24 \qquad 3ab = -18 \qquad 3a + 2b - 4x = -16 \qquad x + 7ab = -38$$

Exercise 58**Solve for x .**

$$\begin{array}{llll}
 x + 3 = 19 & 16 & 2x + 4 = 16 & 6 & 5x - 6 = 3x + 4 & 5 & \frac{x}{2} - 6 = 4 & 20 \\
 .3x = 2.7 & 9 & \frac{1}{3}x = 5 & 15 & 2x = 18 & 9 & 7x - 9 = 5x + 3 & 6
 \end{array}$$

Simplify.

$$(9) + (-12) = -3 \quad (-5)(-4) = 20 \quad -\frac{12}{6} = -2 \quad (-6) - (-7) = 1$$

Exercise 59 (quiz—6 each)**Simplify.**

$$\begin{array}{llll}
 (-8) - (-6) = -2 & (-12)(-3) = 36 & -\frac{10}{-5} = 2 & (-13) + (+7) = -6 \\
 \frac{24}{-8} = -3 & (-6)(-5)(2) = 60 & (11) - (-8) = 19 & (-5) + (-6) + (-7) - (-5) = -13 \\
 (-5)(0)(6) = 0 & -\frac{16}{4} = -4 & (-12) + (-4) = -16 & (9) - (-8) = 17
 \end{array}$$

Solve for x .

$$x - 5 = 4 \quad 9 \quad \frac{2}{3}x = 4 \quad 6 \quad 9x - 9 = 7x + 3 \quad 6 \quad \frac{x}{5} + 1 = 3 \quad 10$$

Exercise 60**Write a proportion and solve.**

If 4 pounds of meat serves 10 people, how many pounds are needed to serve 17 people? $\frac{4}{10} = \frac{x}{17}; x = 6.8 \text{ lb.}$

Mr. Rhodes traveled 623 miles in 7 hours. At the same rate, how many miles will he travel in 9 hours? $\frac{623}{7} = \frac{x}{9}; x = 801 \text{ mi.}$

On a scale drawing, $\frac{1}{4}$ inch equals 1 foot. If the length of a room on a scale drawing is $5\frac{1}{4}$ inches, how long is the room? $\frac{\frac{1}{4}}{1} = \frac{5\frac{1}{4}}{x}; x = 21 \text{ ft.}$

If 7 pencils cost \$.84, find the cost of 10 pencils.

$$\frac{7}{.84} = \frac{10}{x}; x = \$1.20$$

$$\begin{array}{l}
 \frac{7}{.84} = \frac{10}{x} \\
 7x = 8.4 \\
 \frac{7x}{7} = \frac{8.4}{7} \\
 x = \$1.20
 \end{array}$$

$$\frac{4}{10} = \frac{x}{17}$$

$$10x = 68$$

$$\frac{10x}{10} = \frac{68}{10}$$

$$x = 6.8 \text{ lb.}$$

$$\frac{623}{7} = \frac{x}{9}$$

$$7x = 5,607$$

$$\frac{7x}{7} = \frac{5,607}{7}$$

$$x = 801 \text{ mi.}$$

$$\frac{\frac{1}{4}}{1} = \frac{5\frac{1}{4}}{x}$$

$$\frac{1}{4}x = 5\frac{1}{4}$$

$$\cancel{4} \cdot \frac{1}{\cancel{4}}x = \frac{21}{\cancel{4}} \cdot \cancel{4}$$

$$x = 21 \text{ ft.}$$

Exercise 61

(An exponent is a figure, usually a number, written a little to the right and above a number or letter (called the base) and indicates the number of times the base is to be used as a factor.)

Simplify if $a = 2$, $b = 3$, and $x = 4$.

$$x^2 - ab = 10 \quad b^4 + x = 85 \quad a^3 b^2 x = 288 \quad 2a^2 x = 32$$

$$x + a^2 b = 16 \quad 3a + b^2 - 2x = 7 \quad 2a^2 + 3(b + x^2) = 65 \quad 4(x^2 - a^2) = 48$$

Exercise 62

(To write a negative power as a positive power, write it as a reciprocal. 10^{-2} can be written as $\frac{1}{10^2}$.)

Write as a positive power.

$$5^{-2} \frac{1}{5^2} \quad x^{-2} \frac{1}{x^2} \quad b^{-3} \frac{1}{b^3} \quad y^{-5} \frac{1}{y^5}$$

$$\frac{1}{8^{-2}} 8^2 \quad \frac{1}{a^{-3}} a^3 \quad \frac{1}{10^{-5}} 10^5 \quad \frac{1}{x^{-2}} x^2$$

Evaluate each.

$$5^{-2} = \frac{1}{25} \quad 10^{-2} = \frac{1}{100} \quad 8^{-3} = \frac{1}{512} \quad 2^{-5} = \frac{1}{32}$$

Exercise 63

(Every number is the product of equal factors, known as the root of the original number. A perfect square root is a number whose square root is a whole number.)

Write the perfect square.

$$\sqrt{16} \ 4 \quad \sqrt{64} \ 8 \quad \sqrt{144} \ 12 \quad \sqrt{9} \ 3 \quad \sqrt{4} \ 2 \quad \sqrt{25} \ 5$$

$$\sqrt{121} \ 11 \quad \sqrt{81} \ 9 \quad \sqrt{1} \ 1 \quad \sqrt{100} \ 10 \quad \sqrt{49} \ 7 \quad \sqrt{169} \ 13$$

Evaluate if $a = \sqrt{4}$, $b = \sqrt{25}$, and $x = \sqrt{9}$.

$$abx = 30 \quad 3ab = 30 \quad 3a + 2b - 4x = 4 \quad x + 7ab = 73$$

Exercise 64

Extract the square root.

$$\sqrt{2,809} \ 53 \quad \sqrt{400} \ 20 \quad \sqrt{625} \ 25 \quad \sqrt{169} \ 13 \quad \sqrt{196} \ 14$$

$$\sqrt{1,764} \ 42 \quad \sqrt{5,041} \ 71 \quad \sqrt{961} \ 31 \quad \sqrt{4,356} \ 66 \quad \sqrt{8,100} \ 90$$

Exercise 65

What percent of the first 15 whole numbers have exactly 4 distinct whole number divisors? (1, 2, 3, and 6 are the four distinct divisors of 6.) $33\frac{1}{3}\%$
 $6 - 1, 2, 3, 6$
 $8 - 1, 2, 4, 8$
 $10 - 1, 2, 5, 10$
 $14 - 1, 2, 7, 14$
 $15 - 1, 3, 5, 15$
 $\frac{5}{15} = 33\frac{1}{3}\%$

What percent of the first 10 whole numbers are prime? (Remember, a prime number has only 1 and itself as factors.) 40%
 $2, 3, 5, 7$
 $\frac{4}{10} = 40\%$

What percent of the first 10 whole numbers are perfect squares? 30%
 $1, 4, 9$
 $\frac{3}{10} = 30\%$

Exercise 66

(The mean of a group of statistics is the average and is found in the same way as an arithmetic average.)

Find each mean.

56; 59; 51; 63; 68; 57; 52 58 146; 153; 117; 148 141 200; 141; 257; 199 199.25

912; 738; 420 690 15; 9; 7; 6; 8; 11; 4; 9; 6; 7 8.2 19; 27; 34; 18; 23 24.2

Exercise 67

(Mathematical probability is a number expressed as a ratio that shows how likely it is that something will occur. Use this formula: $\text{Probability} = \frac{\text{number of favorable outcomes}}{\text{total number of possible outcomes}}$.)

Answer the questions about a spinner with the numbers 1–10 on its face.

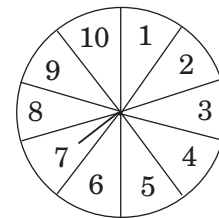
What is the probability that the pointer will stop on 7? $\frac{1}{10}$

What is the probability that the pointer will stop on 3 or 9? $\frac{1}{5}$

What is the probability that the pointer will stop on a perfect square? $\frac{3}{10}$

What is the probability that the pointer will stop on an even number? $\frac{1}{2}$

What is the probability that the pointer will stop on a prime number? $\frac{2}{5}$



Exercise 68

Write a proportion and find each answer. Use this format for the proportion: $\frac{\text{percentage}}{\%} = \frac{\text{base}}{100\%}$.

14% of 980 $\frac{x}{14} = \frac{980}{100}$ 12 is 75% of what number? $\frac{12}{75} = \frac{x}{100}$ 150 is 120% of what number? $\frac{150}{120} = \frac{x}{100}$
 $x = 137.2$ $x = 16$ $x = 125$

$3\frac{1}{2}\%$ of 50 $\frac{x}{3.5} = \frac{50}{100}$ 15 is what % of 50? $\frac{15}{x} = \frac{50}{100}$ 28 is what % of 140? $\frac{28}{x} = \frac{140}{100}$
 $x = 1.75$ $x = 30\%$ $x = 20\%$

150% of 80 $\frac{x}{150} = \frac{80}{100}$ 30 is what % of 20? $\frac{30}{x} = \frac{20}{100}$ 78 is 20% of what number? $\frac{78}{20} = \frac{x}{100}$
 $x = 120$ $x = 150\%$ $x = 390$

Exercise 69 (quiz—8 each)

$$7\frac{5}{9} + 6\frac{2}{3} = 14\frac{2}{9} \quad 10\frac{1}{2} - 3\frac{3}{4} = 6\frac{3}{4} \quad 2\frac{2}{3} \times \frac{9}{10} = 2\frac{2}{5} \quad \frac{5}{6} \div \frac{5}{9} = 1\frac{1}{2}$$

$$1\frac{1}{2} + 1\frac{1}{2} + 1\frac{1}{2} = 4\frac{1}{2} \quad 1\frac{1}{2} - 1\frac{1}{2} - 1\frac{1}{2} = -1\frac{1}{2} \quad 1\frac{1}{2} \times 1\frac{1}{2} = 2\frac{1}{4} \quad 1\frac{1}{2} \div 1\frac{1}{2} = 1$$

$$\frac{1}{2}\% \text{ of } 1,000 = 5 \quad 1\frac{1}{4}\% \text{ of } 1,000 = 12.5 \quad \frac{3}{5}\% \text{ of } 1,000 = 6 \quad 6\frac{3}{4}\% \text{ of } 1,000 = 67.5$$

Exercise 70

What is the probability that two numbers chosen at random from this group (1, 2, 3, 4) has a product greater than 6? $\frac{1}{3}$

What is the probability that two numbers chosen at random from this group (1, 2, 3, 4, 5) has a product greater than 12? $\frac{1}{5}$

If 21 students write their names on pieces of paper and put them in a hat, what is the probability that the first student who draws will draw his own name? $\frac{1}{21}$

Suppose a monkey types at a typewriter with only 26 capital letters on the keyboard and types one letter. What is the probability that the monkey will type the letter *M*? $\frac{1}{26}$

1×2 2×3 3×4
 1×3 2×4
 1×4 $\frac{2}{6} = \frac{1}{3}$
 1×2 2×3 3×4 4×5
 1×3 2×4 3×5
 1×4 2×5 $\frac{2}{10} = \frac{1}{5}$
 1×5

Exercise 71

Solve for *x*. Give only positive values.

$$2x - 4 = 3x - 5 \quad 1 \quad \frac{3}{4}x + \frac{1}{8}x = 7 \quad 8 \quad .2x + .15x = 2.1 \quad 6 \quad \frac{2}{3}x + 1 = \frac{5}{6}x - 3 \quad 24$$

$$x^2 = 16 \quad 4 \quad x^2 = 81 \quad 9 \quad \frac{1}{x^2} = 16 \quad \frac{1}{4} \quad \frac{1}{x^2} = 81 \quad \frac{1}{9}$$

Exercise 72

$$5.78 + 9.9 - 0.785 = 14.895 \quad 12.21 - 4.893 + 7.9 = 15.217 \quad 45.894 + 0.93 + 7.8328 = 54.6568$$

$$8.9463 \times .8 = 7.15704 \quad .09685 \times 3,000 = 290.55 \quad 69.896 \times .001 = .069896$$

$$2.8 \div .05 = 56 \quad 45.63 \div 16.9 = 2.7 \quad .0774 \div .0006 = 129$$

Estimate the answers by rounding the terms to the nearest whole numbers.

$$20.3 \times 9.6 \div 1.01 = 200 \quad 0.899 \times 7.5120 = 8 \quad 8.12 \times 9.83 \div 19.715 = 4$$

Exercise 73

Find the simple interest.

$$p = \$15,000; r = 9\%; t = 7 \text{ yr. } \$9,450 \quad p = \$875; r = 10\frac{1}{2}\%; t = 2 \text{ mo. } \$15.31$$

$$p = \$4,500; r = 8\frac{1}{2}\%; t = 2 \text{ yr. } \$765 \quad p = \$55,000; r = 7\frac{3}{4}\%; t = 15 \text{ yr. } \$63,937.50$$

$$p = \$500; r = 18\%; t = 3 \text{ mo. } \$22.50 \quad p = \$1,250; r = 6\frac{1}{4}\%; t = 6 \text{ mo. } \$39.06$$

Exercise 74

(To write a number using scientific notation, write the number as a decimal between 1 and 10. Then multiply or divide by the correct power of ten. If you multiply, the exponent is positive. If you divide, the exponent is negative.)

Write using scientific notation.

$$\begin{array}{llll}
 5,800,000 & 5.8 \times 10^6 & 869,000,000 & 8.69 \times 10^8 \\
 .0000567 & 5.67 \times 10^{-5} & 7,300 & 7.3 \times 10^3 \\
 .0473 & 4.73 \times 10^{-2} & 5,890,000 & 5.89 \times 10^6 \\
 768,000 & 7.68 \times 10^5 & .000574 & 5.74 \times 10^{-4} \\
 32,000 & 3.2 \times 10^4 & .00007 & 7.0 \times 10^{-5} \\
 576.4 & 5.764 \times 10^2 & .0013 & 1.3 \times 10^{-3}
 \end{array}$$

Exercise 75

The sum of two consecutive numbers is 27. What are the two numbers? $x + x + 1 = 27$; $x = 13$; $x + 1 = 14$

$$\begin{array}{l}
 x + x + 1 = 27 \\
 2x + 1 - 1 = 27 - 1 \\
 2x = 26 \\
 \frac{2x}{2} = \frac{26}{2} \\
 x = 13 \\
 x + 1 = 14
 \end{array}$$

The sum of five consecutive numbers is -5. What is the largest of the numbers? $x + x + 1 + x + 2 + x + 3 + x + 4 = -5$; $x + 4 = 1$

$$\begin{array}{l}
 x + x + 1 + x + 2 + x + 3 + x + 4 = -5 \\
 5x + 10 = -5 \\
 5x + 10 - 10 = -5 - 10 \\
 5x = -15
 \end{array}$$

The sum of 3 consecutive even numbers is 48. What is the smallest number? $2x + 2x + 2 + 2x + 4 = 48$; $2x = 14$

$$\begin{array}{l}
 2x + 2x + 2 + 2x + 4 = 48 \\
 6x + 6 = 48 \\
 6x + 6 - 6 = 48 - 6 \\
 6x = 42 \\
 \frac{6x}{6} = \frac{42}{6} \\
 x = 7 \\
 2x = 14
 \end{array}$$

When the smaller of two consecutive numbers is added to the numerator and the larger is added to the denominator in the fraction $\frac{2}{3}$, the result is $\frac{3}{4}$. Find the numbers.

$$\begin{array}{l}
 \frac{2+x}{3+x+1} = \frac{3}{4} \\
 \frac{2+x}{4+x} = \frac{3}{4} \\
 4x + 8 = 3x + 12 \\
 4x - 3x + 8 - 8 = 3x - 3x + 12 - 8 \\
 x = 4 \\
 x + 1 = 5
 \end{array}$$

$$\frac{2+x}{3+x+1} = \frac{3}{4}; x = 4; x + 1 = 5$$

Exercise 76

Write the prime factors.

$$144 \quad 2 \times 2 \times 2 \times 2 \times 3 \times 3 \quad 57 \quad 3 \times 19 \quad 108 \quad 2 \times 2 \times 3 \times 3 \times 3 \quad 64 \quad 2 \times 2 \times 2 \times 2 \times 2 \times 2$$

Write the greatest common factor (gcf) for each set of numbers.

$$36; 24; 48 \quad 12 \quad 15; 12; 75 \quad 3 \quad 30; 20; 50 \quad 10 \quad 18; 72; 36 \quad 18$$

Reduce to lowest terms.

$$\frac{12}{18} \frac{2}{3} \quad \frac{36}{40} \frac{9}{10} \quad \frac{24}{144} \frac{1}{6} \quad \frac{90}{115} \frac{18}{23} \quad \frac{10}{55} \frac{2}{11} \quad \frac{42}{56} \frac{3}{4} \quad \frac{81}{108} \frac{3}{4} \quad \frac{15}{45} \frac{1}{3}$$

Exercise 77

Order the fractions from least to greatest.

$$\begin{array}{llll}
 \frac{5}{8}, \frac{5}{9}, \frac{7}{8}, \frac{7}{9} & \frac{5}{9}, \frac{5}{8}, \frac{7}{9}, \frac{7}{8} & \frac{3}{4}, \frac{7}{8}, \frac{2}{3}, \frac{5}{6} & \frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{7}{8} \\
 \frac{1}{13}, \frac{1}{5}, \frac{1}{10}, \frac{1}{8} & \frac{1}{13}, \frac{1}{10}, \frac{1}{8}, \frac{1}{5} & \frac{11}{15}, \frac{4}{15}, \frac{7}{15}, \frac{1}{15} & \frac{1}{15}, \frac{4}{15}, \frac{7}{15}, \frac{11}{15} \\
 \frac{1}{8}, \frac{1}{6}, \frac{1}{3}, \frac{1}{5} & \frac{1}{8}, \frac{1}{6}, \frac{1}{5}, \frac{1}{3} & \frac{2}{3}, \frac{2}{11}, \frac{2}{9}, \frac{2}{7} & \frac{2}{11}, \frac{2}{9}, \frac{2}{7}, \frac{2}{3} \\
 \frac{5}{8}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6} & \frac{5}{8}, \frac{2}{3}, \frac{3}{4}, \frac{5}{6} & \frac{7}{25}, \frac{13}{50}, \frac{17}{100}, \frac{1}{10} & \frac{1}{10}, \frac{17}{100}, \frac{13}{50}, \frac{7}{25}
 \end{array}$$

Exercise 78

(In order of operations, powers and radicals are simplified before multiplication and division are done in the order they appear.)

Simplify.

$$6 + 3^2 \times 6 - 40 = 20$$

$$3.14(5)^2 = 78.5$$

$$\frac{1}{3}(3.14)(5)^2(15) = 392.5$$

$$4^2 + 3^2 - 2^2 = 21$$

$$4^2 \times 3^2 \div 2^2 = 36$$

$$5(\sqrt{9} + \sqrt{25} - \sqrt{100}) = -10$$

Write using scientific notation.

$$786,000 \quad 7.86 \times 10^5 \quad .000043 \quad 4.3 \times 10^{-5} \quad 18,890,000 \quad 1.889 \times 10^7 \quad .0000058 \quad 5.8 \times 10^{-6}$$

Exercise 79 (quiz—7 each)

Simplify.

$$3 + 8 \div 4 = 5$$

$$6^2 - 4 \times 2 = 28$$

$$\frac{9}{3} + 8(4 \div 2) = 19$$

$$(5 - 4)(6 + 2) = 8$$

$$9 \div 3 + 2 = 5$$

$$\frac{9 + 3 \times 2}{3} = 5$$

Write using scientific notation.

$$8,400 \quad 8.4 \times 10^3 \quad .034 \quad 3.4 \times 10^{-2} \quad .00028 \quad 2.8 \times 10^{-4} \quad 125,000 \quad 1.25 \times 10^5$$

Write the prime factors.

$$12 \quad 2 \times 2 \times 3$$

$$25 \quad 5 \times 5$$

$$16 \quad 2 \times 2 \times 2 \times 2$$

$$20 \quad 2 \times 2 \times 5$$

Exercise 80

Find the 2-digit repetend (the digits that repeat indefinitely in a repeating decimal) for $\frac{7}{11} \dots 63 \dots$ $\frac{.63 \dots}{11 \overline{)7.0000}}$

Find the 6-digit repetend for $\frac{5}{13} \dots 384615 \dots$ $\frac{.384615 \dots}{13 \overline{)5.000000}}$

Find the 16-digit repetend for $\frac{3}{17} \dots 1764705882352941 \dots$ $\frac{.1764705882352941 \dots}{17 \overline{)3.0000000000000000}}$

Exercise 81

Evaluate if $m = -3$, $n = 2$, $x = 0$, and $y = -1$.

$$m^2 - my = 6$$

$$4n^3 = 32$$

$$3(m - n) = -15$$

$$\frac{mn}{ny} = 3$$

$$2mn^2 + 4x = -24$$

$$5m - n^2y = -11$$

$$m^2n^2xy^2 = 0$$

$$16xy + 2mn = -12$$

Exercise 82

Find each mean.

$-5; 6; -4; -7; 8; -6; 0; 8$ $|-3|; |-8|; |-9|; |4|$ $\sqrt{16}; \sqrt{81}; \sqrt{36}; \sqrt{25}$
 $234; 896; 473; 684; 678; 335$ 5% of 80; 10% of 80; 15% of 80; 30% of 80

Find the probability concerning a spinner with the numbers 1–25. Express each answer as a percent.

What is the probability that the pointer will stop on a perfect square? 20%

What is the probability that the pointer will stop on a prime number? 36%

What is the probability that the pointer will stop on a number greater than the mean of 12; 16; 20; 22; and 15? 32%

What is the probability that the pointer will stop on a negative number? 0%

Exercise 83

Find the travel time. Use hours and minutes for the first three problems. Use years, days, hours, and minutes for the last problem.

Derek left his house at 6:40 A.M. and arrived at school at 7:55 A.M. 1 hr. 15 min.

The plane took off at 10:45 A.M. and landed at 1:15 P.M. 2 hr. 30 min.

The boat left harbor at 3:00 P.M. on Monday and returned on Thursday at 1:30 A.M. 58 hr. 30 min.

The spacecraft left on June 3, 1994, at 8:00 A.M. and returned on August 28, 1997, at 4:14 P.M. 3 yr. 86 da. 8 hr. 14 min.

Exercise 84

(Perimeter is the distance around a polygon and is found by adding the lengths of the sides. The formula for the perimeter of a square is $P = 4s$. The formula for a rectangle is $P = 2l + 2w$.)

Find the perimeter.

Rectangle	Square	Square
$l = 19$ ft.	$s = 9$ in. 36 in.	$s = 4.3$ ft. 17.2 ft.
$w = 7$ ft. 52 ft.		

Rectangle	Rectangle	Square
$l = 11$ in.	$l = 5$ ft.	$s = 2\frac{2}{3}$ in. $10\frac{2}{3}$ in.
$w = 9\frac{1}{2}$ in. 41 in.	$w = 15$ in. 150 in. or $12\frac{1}{2}$ ft.	

Exercise 85

How many integers (counting numbers, inverses of counting numbers, and 0) satisfy $1 < |x - \frac{2}{3}| < 3$? (Remember, parallel bars around a quantity mean absolute value.) 4

$$\begin{array}{cccc} x = -2 & x = -1 & x = 2 & x = 3 \\ 1 < |-2 - \frac{2}{3}| < 3 & 1 < |-1 - \frac{2}{3}| < 3 & 1 < |2 - \frac{2}{3}| < 3 & 1 < |3 - \frac{2}{3}| < 3 \\ 1 < 2\frac{2}{3} < 3 & 1 < 1\frac{2}{3} < 3 & 1 < 1\frac{1}{3} < 3 & 1 < 2\frac{1}{3} < 3 \end{array}$$

How many integers satisfy $5 \leq x + 3 \leq 10$? (\leq means less than or equal to.) 6

$$\begin{array}{cccccc} x = 2 & x = 3 & x = 4 & x = 5 & x = 6 & x = 7 \\ 5 \leq 2 + 3 \leq 10 & 5 \leq 3 + 3 \leq 10 & 5 \leq 4 + 3 \leq 10 & 5 \leq 5 + 3 \leq 10 & 5 \leq 6 + 3 \leq 10 & 5 \leq 7 + 3 \leq 10 \\ 5 \leq 5 \leq 10 & 5 \leq 6 \leq 10 & 5 \leq 7 \leq 10 & 5 \leq 8 \leq 10 & 5 \leq 9 \leq 10 & 5 \leq 10 \leq 10 \end{array}$$

How many integers satisfy $2 \leq |x + 1| \leq 5$? 8

$$\begin{array}{cccccc} x = -6 & x = -5 & x = -4 & x = -3 & x = -2 & x = -1 \\ 2 \leq |-6 + 1| \leq 5 & 2 \leq |-5 + 1| \leq 5 & 2 \leq |-4 + 1| \leq 5 & 2 \leq |-3 + 1| \leq 5 & 2 \leq |-2 + 1| \leq 5 & 2 \leq |-1 + 1| \leq 5 \\ 2 \leq 5 \leq 5 & 2 \leq 4 \leq 5 & 2 \leq 3 \leq 5 & 2 \leq 2 \leq 5 & 2 \leq 1 \leq 5 & 2 \leq 0 \leq 5 \\ x = 1 & x = 2 & x = 3 & x = 4 & & \\ 2 \leq |1 + 1| \leq 5 & 2 \leq |2 + 1| \leq 5 & 2 \leq |3 + 1| \leq 5 & 2 \leq |4 + 1| \leq 5 & & \\ 2 \leq 2 \leq 5 & 2 \leq 3 \leq 5 & 2 \leq 4 \leq 5 & 2 \leq 5 \leq 5 & & \end{array}$$

Exercise 86

(Area is the measure of the surface of a simple closed shape. The formula for the area of a square is $A = s^2$. The formula for a rectangle is $A = lw$. The formula for a triangle is $A = \frac{1}{2}bh$.)

Find the area.

Rectangle

$$l = 7 \text{ ft.}$$

$$w = 6 \text{ ft. } 42 \text{ sq. ft.}$$

Square

$$s = 11 \text{ in. } 121 \text{ sq. in.}$$

Triangle

$$b = 4.3 \text{ ft.}$$

$$h = 5 \text{ ft. } 10.75 \text{ sq. ft.}$$

Rectangle

$$l = 9\frac{3}{4} \text{ in.}$$

$$w = 4\frac{4}{5} \text{ in. } 46\frac{4}{5} \text{ sq. in.}$$

$$\text{or } 46.8 \text{ sq. in.}$$

Triangle

$$b = 5\frac{1}{3} \text{ ft.}$$

$$h = 24 \text{ in. } 5\frac{1}{3} \text{ sq. ft.}$$

$$\text{or } 768 \text{ sq. in.}$$

Square

$$s = 5.5 \text{ in. } 30.25 \text{ sq. in.}$$

Exercise 87 (quiz—8 each)

Find the perimeter.

Rectangle

$$l = 3 \text{ ft.}$$

$$w = 2 \text{ ft. } 10 \text{ ft.}$$

Square

$$s = 4 \text{ in. } 16 \text{ in.}$$

Rectangle

$$l = 12 \text{ ft.}$$

$$w = 5 \text{ ft. } 34 \text{ ft.}$$

Find the area.

Rectangle

$$l = 10 \text{ yd.}$$

$$w = 8 \text{ yd. } 80 \text{ sq. yd.}$$

Triangle

$$l = 9 \text{ ft.}$$

$$w = 4 \text{ ft. } 18 \text{ sq. ft.}$$

Square

$$s = 4 \text{ in. } 16 \text{ sq. in.}$$

Write the square root.

$$\sqrt{49} \ 7$$

$$\sqrt{81} \ 9$$

$$\sqrt{169} \ 13$$

$$\sqrt{100} \ 10$$

$$\sqrt{121} \ 11$$

$$\sqrt{25} \ 5$$

Exercise 88

(Circumference is the distance around a circle. The formulas are $C = \pi d$ and $C = 2\pi r$.) (2 radii $[r]$ are equal to 1 diameter $[d]$.)

Find the circumference. If necessary, round off to the nearest hundredth.

$d = 4$ ft. *12.56 ft.* $r = 6.5$ m *40.82 m* $r = 17$ ft. *106.76 ft.* $d = 6$ in. *18.84 in.*
 $r = 2\frac{1}{2}$ yd. *15.7 yd.* $d = 12.9$ cm *40.51 cm* $d = 3.5$ km *10.99 km* $r = 7$ ft. *43.96 ft.*

Exercise 89

(The formula for the area of a circle is $A = \pi r^2$. Remember, 1 diameter equals 2 radii.)

Find the area. If necessary, round off to the nearest hundredth.

$d = 4$ ft. *12.56 sq. ft.* $r = 6.5$ m *132.67 m²* $r = 17$ ft. *907.46 sq. ft.* $d = 6$ in. *28.26 sq. in.*
 $r = 2\frac{1}{2}$ yd. *19.63 sq. yd.* $d = 12.9$ cm *130.63 cm²* $d = 3.5$ km *9.62 km²* $r = 7$ ft. *153.86 sq. ft.*

Exercise 90

What is the area of a rectangle that has a length of 3.134×10^3 ft. and a width of 2.568×10^3 ft.? Write your answer using scientific notation and with 2 significant figures. (Decimal part of scientific notation must be rounded to tenths to have 2 significant figures [sig figs].)

$$\begin{array}{r} A = l \times w \qquad 3,134 \\ A = 3,134 \times 2,568 \times \frac{2,568}{2,568} \\ A = 8.0 \times 10^6 \qquad \frac{15672}{25072} \\ \qquad \qquad \qquad 18804 \\ \qquad \qquad \qquad 15670 \\ \qquad \qquad \qquad +6268 \\ \hline 8048112 = 8.0 \times 10^6 \end{array}$$

What is the area of a circle that has a radius of 14.7 ft.? Write your answer using scientific notation and with 2 sig figs.

$$\begin{array}{r} 14.7 \qquad 216.09 \\ A = \pi r^2 \qquad \times 14.7 \qquad \times 3.14 \\ A = 3.14(14.7) \qquad 1029 \qquad 86436 \\ A = 3.14(216.09) \qquad 588 \qquad 21609 \\ A = 6.8 \times 10^2 \qquad +147 \qquad +64827 \\ \hline 216.09 \qquad 6785226 = 6.8 \times 10^2 \end{array}$$

What is the area of a triangle that has a base of 4.73×10^2 ft. and a height of 2.06×10^2 ft.? Write your answer using scientific notation and with 2 sig figs.

$$\begin{array}{r} A = \frac{1}{2}bh \qquad 473 \\ A = \frac{1}{2} \times 473 \times 206 \qquad \times 103 \\ \qquad \qquad \qquad 1419 \\ A = 103 \times 473 \qquad +4730 \\ \hline A = 4.9 \times 10^4 \qquad 48719 = 4.9 \times 10^4 \end{array}$$

Exercise 91

(1 acre equals 43,560 square feet, and 1 square mile equals 640 acres.)

4 sq. yd. = 36 sq. ft. 2.5 acres = 108,900 sq. ft. 18 sq. ft. = 2 sq. yd.
 720 sq. in. = 5 sq. ft. 81 sq. ft. = 9 sq. yd. 7 sq. yd. = 63 sq. ft.
 .4 acre = 17,424 sq. ft. 5 sq. mi. = 3,200 acres $\frac{3}{4}$ acre = 32,670 sq. ft.

Exercise 92

(The measure of the content or capacity of a solid figure is called volume. The formula for the volume of a cube is $V = e^3$.)

Find the volume of each cube. If necessary, round off to the nearest hundredth.

$$\begin{array}{llll}
 e = 3 \text{ ft. } 27 \text{ cu. ft.} & e = 6 \text{ in. } 216 \text{ cu. in.} & e = 3.5 \text{ yd. } 42.88 \text{ cu. yd.} & e = 15 \text{ in. } 3,375 \text{ cu. in.} \\
 e = 10 \text{ in. } 1,000 \text{ cu. in.} & e = 3\frac{1}{4} \text{ ft. } 34.33 \text{ cu. ft.} & e = 2\frac{1}{2} \text{ ft. } 15.63 \text{ cu. ft.} & e = 5.8 \text{ cm } 195.11 \text{ cm}^3 \\
 & \text{or } 34\frac{21}{64} \text{ cu. ft.} & \text{or } 15\frac{5}{8} \text{ cu. ft.} &
 \end{array}$$

Exercise 93

(The formula for the volume of a rectangular solid is $V = lwh$.)

Find the volume of each rectangular solid.

$$\begin{array}{llll}
 l = 14 \text{ ft.} & l = 15 \text{ ft.} & l = 23 \text{ in.} & l = 11 \text{ ft.} \\
 w = 9 \text{ ft.} & w = 12 \text{ ft.} & w = 18 \text{ in.} & w = 10 \text{ ft.} \\
 h = 12 \text{ ft. } 1,512 \text{ cu. ft.} & h = 8 \text{ ft. } 1,440 \text{ cu. ft.} & h = 25 \text{ in. } 10,350 \text{ cu. in.} & h = 7\frac{1}{2} \text{ ft. } 825 \text{ cu. ft.}
 \end{array}$$

Find the volume of each cube. If necessary, round off to the nearest hundredth.

$$\begin{array}{llll}
 e = 5 \text{ in. } 125 \text{ cu. in.} & e = 1\frac{3}{4} \text{ ft. } 5.36 \text{ cu. ft.} & e = 3\frac{2}{3} \text{ ft. } 49\frac{8}{27} \text{ cu. ft.} & e = 2.4 \text{ cm } 13.82 \text{ cm}^3 \\
 & \text{or } 5\frac{23}{64} \text{ cu. ft.} & &
 \end{array}$$

Exercise 94

Change to cubic feet.

$$4 \text{ cu. yd. } 108 \text{ cu. ft.} \quad 6,912 \text{ cu. in. } 4 \text{ cu. ft.} \quad 2\frac{1}{2} \text{ cu. yd. } 67.5 \text{ cu. ft.} \quad 10 \text{ cu. yd. } 270 \text{ cu. ft.}$$

Change to cubic inches.

$$5 \text{ cu. ft. } 8,640 \text{ cu. in.} \quad 1\frac{1}{2} \text{ cu. ft. } 2,592 \text{ cu. in.} \quad 1 \text{ cu. yd. } 46,656 \text{ cu. in.} \quad 10 \text{ cu. ft. } 17,280 \text{ cu. in.}$$

Exercise 95

A rectangle has a length of 30 cm and a width of 10 cm. If each dimension is increased by 10%, by what percent is the area of the original rectangle increased? 21%

Using the information concerning the above rectangle, by what percent is the perimeter of the original rectangle increased? 10%

A cube has a volume of 216 cu. in. What is the length of each edge? 6 in.

$$300 \text{ cm}^2 \quad 33 \times 11 = 363 \text{ cm}^2$$

$$\frac{363}{300} = \frac{63}{100} = \frac{21}{100} = 21\%$$

$$80 \text{ cm} \quad 66 + 22 = 88 \text{ cm}$$

$$\frac{88}{80} = \frac{11}{10} = 10\%$$

$$V = e^3$$

$$216 = e^3$$

$$\sqrt[3]{216} = \sqrt[3]{e^3}$$

$$6 = e$$

Exercise 96

$$7\frac{3}{8} + 4\frac{5}{6} + 8\frac{5}{12} = 20\frac{5}{8} \quad 12\frac{2}{3} - 6\frac{3}{7} = 6\frac{5}{21} \quad 8\frac{1}{2} + 17\frac{2}{3} + 12\frac{1}{6} = 38\frac{1}{3}$$

$$21\frac{1}{5} - 18\frac{1}{2} = 2\frac{7}{10} \quad 5 - 4\frac{3}{5} = \frac{2}{5} \quad 3\frac{1}{2} \times \frac{2}{3} = 2\frac{1}{3} \quad 7\frac{1}{2} \times 1\frac{1}{6} = 8\frac{3}{4}$$

$$1\frac{1}{4} \times 12 = 15 \quad 2\frac{2}{3} \div 1\frac{5}{9} = 1\frac{5}{7} \quad \frac{2}{3} \div \frac{5}{6} = \frac{4}{5} \quad \frac{20}{4\frac{1}{2}} = 4\frac{4}{9}$$

Order the decimals in each row from least to greatest.

.067	.7	1.36	.702	.071	.026
.026	.067	.071	.7	.702	1.36
.81	.008	.819	.82	.081	.801
.008	.081	.801	.81	.819	.82

Exercise 97 (quiz—8 each)

$$8.99 + 0.67 - 3.784 = 5.876 \quad 81.74 - 13.895 + 79.44 = 147.285 \quad 11.8954 + 4.884 + 0.783 = 17.5624$$

$$.0785 \times .4 = .0314 \quad 950 \times .005 = 4.75 \quad 9\frac{4}{5} \times \frac{5}{7} = 7$$

$$.703 \div 1.9 = .37 \quad 570 \div 100 = 5.7 \quad 5\frac{5}{11} \div 2\frac{2}{5} = 2\frac{3}{11}$$

$$3\frac{2}{3} + 4\frac{4}{5} = 8\frac{7}{15} \quad .002 \times .001 = .000002 \quad 15\frac{7}{9} - 6\frac{2}{3} = 9\frac{1}{9}$$

Exercise 98

12 is what % of 15? 80% 48% of 180 = 86.4 20% of what number is 16? 80

Write $37\frac{1}{2}\%$ as a fraction. $\frac{3}{8}$ Write 91% as a ratio. 91:100

Subtract 74% from 100%. 26% Write $\frac{7}{8}$ as a percent. 87.5%

Add 12% to 46%. 58% Write $71\frac{5}{8}\%$ as a decimal. .71625

Exercise 99

Solve for x . x must be an integer.

$$6(2x + 4) = 120 \quad 8 \quad \frac{3}{4}x = \sqrt{36} \quad 8 \quad 2x + 6 = 5x - 9 \quad 5$$

$$10 > (2x + 3) > 8 \quad 3 \quad 11 > \frac{x}{5} > 9 \quad 50 \quad 15 \geq (5x + 6) \geq 11 \quad 1$$

Exercise 100

A city that is considering a 1¢ sales tax conducted a survey of 1,000 citizens. The results of the survey were as follows.

Favor — 318

Oppose — 492

Undecided—190

What percent oppose the sales tax? 49.2%

If 60% of those undecided later favor the tax, what percent now favor the tax? 43.2%

$$\begin{array}{r} 190 \\ \times .6 \\ \hline 114.0 \end{array} + \begin{array}{r} 318 \\ + 114 \\ \hline 432 \end{array} = 43.2\%$$

Of those who oppose the tax, only 25% take the time to go to the polls and vote against the tax. How many of the 492 voted against the tax? 123

$$\frac{1}{4} \text{ of } 492 = 123$$

In the election, only 14% of the city's 97,500 registered voters voted. The sales tax passed by 150 votes. How many voted against the tax? $6,750$

$$\begin{array}{r} 97,500 \\ \times .14 \\ \hline 13,650.00 \end{array} \quad \begin{array}{r} 13,650 \\ \times .5 \\ \hline 6,825.0 \end{array} \quad \begin{array}{r} 6,825 \\ - 75 \\ \hline 6,750 \end{array}$$

The 150 margin was what percent of the total votes? Find the answer to the nearest tenth of one percent. 1.1%

$$\frac{150}{13,650} = \frac{3}{273} = \frac{1}{91} \quad 91 \overline{) 1.0000} \quad .0109 = 1.1\%$$

The 150 margin was what percent of the total registered voters? Find the answer to the nearest tenth of one percent. 0.2%

$$\frac{150}{97,500} = \frac{3}{1,950} = \frac{1}{650} \quad 650 \overline{) 1.0015} = 0.2\%$$

Exercise 101

(Two angles with a sum of 90° are complementary angles. Two angles with a sum of 180° are supplementary.)

Write the number of degrees in the complements of the given angles.

23° 67° 45° 45° 56° 34° 60° 30° $18\frac{1}{2}^\circ$ $71\frac{1}{2}^\circ$ 45.5° 44.5°

Write the number of degrees in the supplements of the given angles.

87° 93° 122° 58° 98.5° 81.5° 135° 45° $113\frac{1}{4}^\circ$ $66\frac{3}{4}^\circ$ 95.5° 84.5°

Classify each angle as acute, obtuse, or right.

76° *acute* 90° *right* 114° *obtuse* 93° *obtuse* 89° *acute* 15° *acute*

Exercise 102

(The sum of the three angles in a triangle is 180° .)

Write the number of degrees in the third angle of a triangle.

45° ; 45° 90° 30° ; 70° 80° 60° ; 60° 60° 25° ; 65° 90° 30° ; 90° 60° 28° ; 74° 78°

Classify each triangle having these angles as acute, obtuse, or right.

90° ; 30° ; 60° *right* 35° ; 110° ; 35° *obtuse* 60° ; 60° ; 60° *acute* 45° ; 90° ; 45° *right*

The two base angles of an isosceles triangle each contain twice as many degrees as the third angle. How many degrees are in each angle? (The base angles of an isosceles triangle are congruent.) $x + 2x + 2x = 180$ 36° ; 72° ; 72°

The third angle of a triangle contains twice as many degrees as the first angle. The second angle contains 20 more degrees than the first angle. How many degrees are in each angle? $x + x + 20 + 2x = 180$ 40° ; 60° ; 80°

Exercise 103

Find the perimeter or circumference. If necessary, round to the nearest hundredth.

Rectangle	Square	Circle	Circle
$l = 25$ ft.	$s = 6\frac{3}{4}$ in. 27 in.	$r = 4\frac{1}{2}$ ft. 28.26 ft.	$d = 6.7$ m 21.04 m
$w = 21$ ft. 92 ft.			

Find the area. If necessary, round to the nearest hundredth.

Rectangle	Triangle	Square	Circle
$l = 27$ ft.	$b = 42$ ft.	$s = 3.75$ in. 14.06 sq. in.	$d = 10$ in. 78.5 sq. in.
$w = 5$ yd. 405 sq. ft.	$h = 19$ ft. 399 sq. ft.	or $14\frac{1}{16}$ sq. in.	
or 45 sq. yd.			

A triangular piece of land has a height of $\frac{1}{2}$ mile and a base of $\frac{3}{4}$ mile.
Find the number of acres. 120 acres

$$A = \frac{1}{2}bh$$

$$A = \frac{1}{2} \cdot \frac{3}{4} \cdot \frac{1}{2} = \frac{3}{16} \times \frac{640}{1} = 120 \text{ acres}$$

$$A = \frac{3}{16} \text{ sq. mi.}$$

If the radius of a circle is 24 inches, what is the diameter?
48 in.

$$d = 2r$$

$$d = 2 \cdot 24$$

$$d = 48 \text{ in.}$$

Exercise 104

Find the area. If necessary, round to the nearest hundredth.

Rectangle	Triangle	Square	Circle
$l = 14$ in.	$b = 20$ ft.	$s = 8.3$ in. 68.89 sq. in.	$r = 6.1$ m 116.84 m ²
$w = 10$ in. 140 sq. in.	$h = 18$ ft. 180 sq. ft.		

Find the area. If necessary, round to the nearest hundredth.

Cube	Rectangular Solid	Cube	Rectangular Solid
$e = 6$ in. 216 cu. in.	$l = 12$ ft.	$e = 1.25$ in. 1.95 cu. in.	$l = 5\frac{3}{4}$ in.
	$w = 9$ ft.	or $1\frac{61}{64}$ cu. in.	$w = 2\frac{1}{2}$ in.
	$h = 8$ ft. 864 cu. ft.		$h = 3\frac{2}{3}$ in. 52.71 cu. in.
			or $52\frac{17}{24}$ cu. in.

An aquarium is 28 inches long, 14 inches wide, and 20 inches high. What is the volume of the aquarium?
7,840 cu. in.

$$V = lwh$$

$$V = 28 \times 14 \times 20 = 7,840$$

$$V = 560 \times 14 = 7,840$$

$$V = 7,840 \text{ cu. in.}$$

How much will it cost to dig a swimming pool that is 25 feet long, 12 feet wide, and 4 feet deep at \$1.20 per cubic foot?
\$1,440

$$V = lwh$$

$$V = 25 \times 12 \times 4 = 1,200$$

$$V = 100 \times 12 = 1,200$$

$$V = 1,200 \text{ cu. ft.}$$

Exercise 105

Find the area in square feet for a square that has a perimeter of 32 feet. *64 sq. ft.*

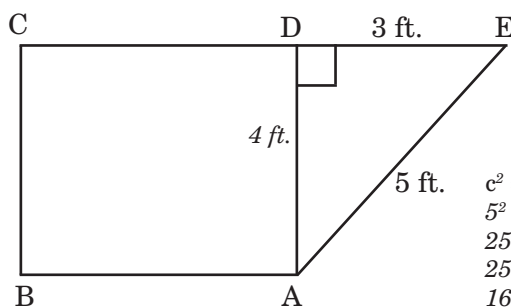
$$\begin{aligned} P &= 4s & A &= s^2 \\ 32 &= 4s & A &= 8^2 \\ \frac{32}{4} &= \frac{4s}{4} & A &= 64 \text{ sq. ft.} \\ 8 &= s \end{aligned}$$

Find the volume in cubic feet for a cube that has a surface area of 96 square feet. (The formula for the surface area of a cube is $SA = 6e^2$.) *64 cu. ft.*

$$\begin{aligned} SA &= 6e^2 & V &= e^3 \\ 96 &= 6e^2 & V &= 4^3 \\ \frac{96}{6} &= \frac{6e^2}{6} & V &= 64 \text{ cu. ft.} \\ 16 &= e^2 \\ \sqrt{16} &= \sqrt{e^2} \\ 4 &= e \end{aligned}$$

A rectangle whose length is twice as long as its width has a perimeter of 60 feet. Find its area in square feet. *200 sq. ft.*

What is the area in square feet for square ABCD? *16 sq. ft.*



$$\begin{aligned} P &= 2l + 2x & A &= lw \\ 60 &= 2(2x) + 2x & A &= 20 \times 10 \\ 60 &= 4x + 2x & A &= 200 \text{ sq. ft.} \\ 60 &= 6x \\ \frac{60}{6} &= \frac{6x}{6} \\ 10 &= x \\ 20 &= 2x \\ A &= s^2 \\ A &= 4^2 \\ A &= 16 \text{ sq. ft.} \end{aligned}$$

$$\begin{aligned} c^2 &= a^2 + b^2 \\ 5^2 &= 3^2 + b^2 \\ 25 &= 9 + b^2 \\ 25 - 9 &= 9 - 9 + b^2 \\ 16 &= b^2 \\ \sqrt{16} &= \sqrt{b^2} \\ 4 &= b \end{aligned}$$

Exercise 106 (quiz—6 each)

$$\begin{aligned} 7\frac{2}{3} + 6\frac{1}{2} + 8\frac{5}{6} &= 23 & 12\frac{1}{6} - 6\frac{5}{7} &= 5\frac{19}{42} & 13\frac{3}{5} + 8\frac{1}{3} + 7\frac{2}{15} &= 29\frac{1}{15} \\ 13 - 6\frac{2}{5} &= 6\frac{3}{5} & 8,796 \times 5 &= 43,980 & 3\frac{2}{5} \times 4\frac{1}{6} &= 14\frac{1}{6} & 3\frac{5}{9} \div 12 &= \frac{8}{27} \\ 1,506 - 972 &= 534 & 349 + 278 + 625 + 281 &= 1,533 & .007 \times .013 &= .000091 & 976.3 + 804.78 &= 1,781.08 \end{aligned}$$

Find the answer by rounding each term to the nearest tenth. Answers should also be to the nearest tenth.

$$30.1 \times .09 = 3.0 \quad 47.999 \div 1.183 = 40.0 \quad 155.21 \times .11 \times .09 = 1.6 \quad .9 \times .9 \times .9 = 1.0$$

Exercise 107

Solve each system of equations for x .

$$\begin{cases} x + y = 7 \\ x - y = 9 \end{cases}$$

$$\begin{cases} x + y = 8 \\ y = x + 2 \end{cases}$$

$$\begin{cases} x + 2y = 10 \\ 2x - y = 5 \end{cases}$$

$$\begin{cases} 3x + 2y = 2.60 \\ 2x + 3y = 2.40 \\ 9x + 6y = 7.80 \\ -4x - 6y = -4.80 \\ \hline 5x = 3.00 \\ \frac{5x}{5} = \frac{3.00}{5} \\ x = \$.60 \end{cases}$$

Three apples and 2 oranges cost \$2.60. Two apples and 3 oranges cost \$2.40. How much does 1 apple cost? (Use a system of equations where apples are x and oranges are y .) *\$.60 or 60¢*

Exercise 108

Write a proportion and find each answer. Use this format for the proportion:

$$\frac{\text{percentage}}{\%} = \frac{\text{base}}{100\%}$$

$$\begin{array}{lll}
 12\frac{1}{2}\% \text{ of } 500 & \frac{x}{12\frac{1}{2}} = \frac{500}{100} & 83 \text{ is } 50\% \text{ of what number? } \frac{83}{50} = \frac{x}{100} \\
 & x = 625 & x = 166 \\
 12\frac{3}{5}\% \text{ of } 400 & \frac{x}{12\frac{3}{5}} = \frac{400}{100} & 25 \text{ is what } \% \text{ of } 100? \frac{25}{x} = \frac{100}{100} \\
 & x = 50\frac{2}{5} & x = 25\% \\
 \frac{1}{2}\% \text{ of } 80 & \frac{x}{\frac{1}{2}} = \frac{80}{100} & 11 \text{ is what } \% \text{ of } 22? \frac{11}{x} = \frac{22}{100} \\
 \frac{90}{125} = \frac{30}{100} & x = \frac{2}{5} & x = 50\% \\
 x = 72 & &
 \end{array}$$

Exercise 109

Simplify.

$$(+6) - (-4) = 10 \quad (-3) \times (-2) = 6 \quad \frac{-16}{-4} = 4 \quad (-8) + (+7) = -1$$

$$\frac{144}{-12} - 12 \quad (-8)(-9)(5) = 360 \quad (12) - (8) = 4 \quad (-9) - (-6) - (-9) + (-6) = 0$$

$$5^2 = 25 \quad \sqrt{64} = 8 \quad \sqrt{7,225} = 85 \quad 8^3 = 512$$

Exercise 110

Brandon made 70% on a math test having 40 problems that counted equally. How many problems did he miss? 12

$$\frac{40}{100} = \frac{x}{30}$$

$$100x = 1200$$

The arithmetic mean of 5 numbers is 15. When the greatest of the numbers is deleted, the mean of the remaining 4 numbers is 12. What number was deleted from the list of 5? 27

$$\frac{100x}{100} = \frac{1200}{100}$$

$$x = 12$$

$$\begin{array}{r}
 15 \quad 12 \quad 75 \\
 \times 5 \quad \times 4 \quad -48 \\
 \hline
 75 \quad 48 \quad 27
 \end{array}$$

Forty percent of the 25 students in Mr. Dickson's math class drank orange juice for breakfast. Of the 40% who drank orange juice, 20% ate a muffin for breakfast. None of the other students ate a muffin. How many students had a muffin for breakfast? 2

$$\begin{array}{r}
 25 \quad 10 \\
 \times .4 \quad \times .2 \\
 \hline
 10.0 \quad 2.0
 \end{array}$$

Two angles are complementary angles. The first angle has four times as many degrees as the second angle. How many degrees are in each angle? 18°; 72°

$$4x + x = 90$$

$$5x = 90$$

$$\frac{5x}{5} = \frac{90}{5}$$

$$x = 18^\circ$$

$$4x = 72^\circ$$

Exercise 111

$$12.895 + 3.895 - 0.0895 = 16.7005 \quad 11.8 - 10.8943 + 67.9045 = 68.8102 \quad 0.58943 + 7.865 + 9.05783 = 17.51226$$

$$.01895 \times .25 = .0047375$$

$$.863 \times .009 = .007767$$

$$1,000 \times .7854 = 785.4$$

$$24.702 \div 3.58 = 6.9$$

$$86.3 \div 100 = .863$$

$$6.8 \times 100 \div 10 = 68$$

Write each decimal as a percent.

$$.895 \text{ } 89.5\%$$

$$.064 \text{ } 6.4\%$$

$$6.54 \text{ } 654\%$$

$$.005 \text{ } 0.5\%$$

$$12.6 \text{ } 1,260\%$$

$$1.1 \text{ } 110\%$$

Write each fraction as a decimal.

$$\frac{3}{4} \text{ } .75$$

$$\frac{1}{8} \text{ } .125$$

$$\frac{1}{5} \text{ } .2$$

$$\frac{2}{3} \text{ } .\bar{6}$$

$$\frac{7}{8} \text{ } .875$$

$$\frac{1}{6} \text{ } .\bar{1}\bar{6}$$

Exercise 112

Write the square root.

$$\sqrt{100} \text{ } 10$$

$$\sqrt{64} \text{ } 8$$

$$\sqrt{4} \text{ } 2$$

$$\sqrt{25} \text{ } 5$$

$$\sqrt{121} \text{ } 11$$

$$\sqrt{1} \text{ } 1$$

Evaluate if $a = \sqrt{81}$, $b = \sqrt{49}$, and $c = \sqrt{16}$.

$$abc = 252$$

$$.5ab = 31.5$$

$$2a - 3b + \frac{1}{2}c = -1$$

$$5c - \frac{2}{3} = 19\frac{1}{3}$$

Extract the square root.

$$\sqrt{529} \text{ } 23$$

$$\sqrt{4,225} \text{ } 65$$

$$\sqrt{2,116} \text{ } 46$$

$$\sqrt{961} \text{ } 31$$

$$\sqrt{8,649} \text{ } 93$$

Exercise 113

Evaluate if $x = 6$, $y = -3$, and $z = 0$.

$$3x^2 + y = 105$$

$$2(xy + z) = -36$$

$$x^3y^2z = 0$$

$$x + 3(y^2 - z) = 33$$

$$y^2 - x = 3$$

$$y^x = 729$$

Write as a positive power.

$$y^{-2} \frac{1}{y^2}$$

$$z^{-3} \frac{1}{z^3}$$

$$2^{-3} \frac{1}{2^3}$$

$$x^{-8} \frac{1}{x^8}$$

$$\frac{1}{5^{-2}} 5^2$$

$$\frac{1}{x^{-3}} x^3$$

$$\frac{1}{3^{-5}} 3^5$$

$$\frac{1}{a^{-3}} a^3$$

Exercise 114

Write the number of degrees in the complements of the given angles.

$$78^\circ \text{ } 12^\circ$$

$$54^\circ \text{ } 36^\circ$$

$$27^\circ \text{ } 63^\circ$$

$$19^\circ \text{ } 71^\circ$$

$$33\frac{4}{5}^\circ \text{ } 56\frac{1}{5}^\circ$$

$$68.5^\circ \text{ } 21.5^\circ$$

Write the number of degrees in the supplements of the given angles.

$$102^\circ \text{ } 78^\circ$$

$$158^\circ \text{ } 22^\circ$$

$$47^\circ \text{ } 133^\circ$$

$$69^\circ \text{ } 111^\circ$$

$$120\frac{1}{2}^\circ \text{ } 59\frac{1}{2}^\circ$$

$$88.6^\circ \text{ } 91.4^\circ$$

Write the number of degrees in the third angle of a triangle.

$$25^\circ; 75^\circ \text{ } 80^\circ$$

$$28^\circ; 62^\circ \text{ } 90^\circ$$

$$90^\circ; 50^\circ \text{ } 40^\circ$$

$$56^\circ; 79^\circ \text{ } 45^\circ$$

$$27^\circ; 73^\circ \text{ } 80^\circ$$

$$44^\circ; 82^\circ \text{ } 54^\circ$$

Two angles are supplementary. One angle is 18° greater than the other.
Find the measure of the two angles. $81^\circ; 99^\circ$

$$x + x + 18 = 180$$

$$2x + 18 - 18 = 180 - 18$$

$$2x = 162$$

$$\frac{2x}{2} = \frac{162}{2}$$

$$x = 81^\circ$$

$$x + 18 = 99^\circ$$

Exercise 115

A rectangle is 3 feet longer than it is wide. If the perimeter is 30 feet, find the area in square feet. *54 sq. ft.*

$$A = lw$$

$$A = 9.6$$

$$A = 54 \text{ sq. ft.}$$

The diameter of a circle is represented as x . How should the radius of the same circle be represented? $\frac{x}{2}$

Find the measure of each angle in a triangle if the first angle measures 3 degrees more than the second angle which contains the same number of degrees as the third angle. $62^\circ; 59^\circ; 59^\circ$

$$P = 2l + 2w$$

$$30 = 2(x + 3) + 2x$$

$$30 = 2x + 6 + 2x$$

$$30 - 6 = 4x + 6 - 6$$

$$24 = 4x$$

$$\frac{24}{4} = \frac{4x}{4}$$

$$6 = x$$

$$9 = x + 3$$

$$x + 3 + x + x = 180$$

$$3x + 3 - 3 = 180 - 3$$

$$3x = 177$$

$$\frac{3x}{3} = \frac{177}{3}$$

$$x = 59^\circ$$

$$x + 3 = 62^\circ$$

Alice Smith bought a clothes dryer that retailed for \$325. She received a 15% discount because she works at the store where she bought the dryer. What was her cost after paying a $7\frac{1}{2}\%$ sales tax? *\$296.97*

$$\begin{array}{r} \$325 \\ \times .85 \\ \hline 1625 \\ 2600 \\ \hline \$276.25 \end{array}$$

$$\begin{array}{r} \$276.25 \\ \times 1.075 \\ \hline 138125 \\ 193375 \\ \hline + 276250 \\ \hline \$296.96875 = \$296.97 \end{array}$$

$$\times .85$$

$$1625$$

$$2600$$

$$\$276.25$$

$$\times 1.075$$

$$138125$$

$$193375$$

$$+ 276250$$

$$\$296.96875 = \$296.97$$

Exercise 116 (quiz—6 each)

$$125\frac{1}{4}\% \text{ of } 50 = 62.625$$

$$12 \text{ is } 75\% \text{ of what number? } 16$$

$$150 \text{ is } 120\% \text{ of what number? } 125$$

$$28 \text{ is what } \% \text{ of } 140? 20\%$$

$$13\frac{1}{5}\% \text{ of } \$40 = \$5.28$$

$$18 \text{ is what } \% \text{ of } 9? 200\%$$

$$54\% \text{ of } \$500 = \$270$$

$$9\frac{1}{2}\% \text{ of } \$750 = \$71.25$$

$$12\% \text{ of } 2,000 = 240$$

$$10\% \text{ of } \$65 = \$6.50$$

$$15\% \text{ of } \$400 = \$60$$

$$20\% \text{ of } \$88 = \$17.60$$

Write each decimal as a percent.

$$.95 \text{ } 95\%$$

$$.03 \text{ } 3\%$$

$$1.56 \text{ } 156\%$$

$$.009 \text{ } 0.9\%$$

$$2.2 \text{ } 220\%$$

Exercise 117

Solve for x .

$$-3(x - 6) = 9 \quad 3$$

$$4x - (2 - 2x) = 28 \quad 5$$

$$3x + 7 = 5x - 9 \quad 8$$

$$ax - 3 = 9 \quad x = \frac{12}{a}$$

$$a(x + 3) - 7 = 4 \quad x = \frac{11 - 3a}{a}$$

$$-x + 3 = ax - 5 \quad x = \frac{8}{a + 1}$$

$$\text{or } \frac{11}{a} - 3$$

Concrete is to be mixed using cement and sand in the ratio 2:5. How much sand will be required to mix with 96 pounds of cement? Use a proportion to solve. *240 lb.*

$$\frac{2}{5} = \frac{96}{x}$$

$$2x = 480$$

$$\frac{2x}{2} = \frac{480}{2}$$

$$x = 240 \text{ lb.}$$

Exercise 118

Find the simple interest.

$$p = \$4,000; r = 10\%; t = 1 \text{ yr. } \$400$$

$$p = \$1,350; r = 9\frac{3}{4}\%; t = 1 \text{ yr. } \$131.63$$

$$p = \$975; r = 13\frac{1}{2}\%; t = 9 \text{ mo. } \$98.72$$

$$p = \$2,000; r = 14\frac{3}{4}\%; t = 2 \text{ yr. } \$590$$

$$p = \$500; r = 6\%; t = 3 \text{ mo. } \$7.50$$

$$p = \$1,250; r = 12\frac{1}{2}\%; t = 6 \text{ mo. } \$78.13$$

Exercise 119

Write using scientific notation.

$$6,895,000 \quad 6.895 \times 10^6$$

$$.000675 \quad 6.75 \times 10^{-4}$$

$$.0083 \quad 8.3 \times 10^{-3}$$

$$7,000,000,000 \quad 7.0 \times 10^9$$

$$89,600,000 \quad 8.96 \times 10^7$$

$$.00000732 \quad 7.32 \times 10^{-6}$$

$$.008754 \quad 8.754 \times 10^{-3}$$

$$.013 \quad 1.3 \times 10^{-2}$$

$$280,000 \quad 2.8 \times 10^5$$

$$.000215 \quad 2.15 \times 10^{-4}$$

$$324,000,000 \quad 3.24 \times 10^8$$

$$4,500 \quad 4.5 \times 10^3$$

Exercise 120

How many cubic inches are contained in a box that is 2 ft. long, 1 ft. wide, and 1 ft. high? *3,456 cu. in.*

$$V = lwh \quad 1,728$$

$$V = 2 \cdot 1 \cdot 1 \quad \times 2$$

$$V = 2 \text{ cu. ft.} \quad 3,456 \text{ cu. in.}$$

Write the probability that the letter *B* will be the first letter in a license plate. $\frac{1}{26}$

The radius of a circle is 10 in. What is the diameter, area, and circumference of the circle? *20 in.; 314 sq. in.; 62.8 in.*

$$d = 2r$$

$$A = \pi r^2$$

$$C = 2\pi r$$

$$d = 2 \times 10$$

$$A = 3.14(10)^2$$

$$C = 2 \times 3.14 \times 10$$

$$d = 20 \text{ in.}$$

$$A = 3.14(100)$$

$$C = 20 \times 3.14$$

$$A = 314 \text{ sq. in.} \quad C = 62.8 \text{ in.}$$

Emily Brooks bought a china cabinet for \$1,500. She paid \$350 down and agreed to pay the remainder in 15 monthly installments of \$82.50 each. How much interest did she have to pay? *\$87.50*

$$\$82.50$$

$$\$1,587.50$$

$$\times 15$$

$$- 1,500$$

$$41250$$

$$\$87.50$$

$$8250$$

$$1,237.50$$

The distance between two rivers is 475 miles. A map that represents the rivers uses the scale 1 in. = 100 mi. How far apart should the rivers be on the map?

$$+ 350$$

$$\$1,587.50$$

$$4\frac{3}{4} \text{ or } 4.75 \text{ in.}$$

$$\frac{1}{100} = \frac{x}{475}$$

$$100x = 475$$

$$\frac{100x}{100} = \frac{475}{100}$$

$$x = 4.75 \text{ in.}$$