

# Practicing for Standardized Tests

As you work closely with your classmates and teachers on a daily basis, they will have a good idea of what you know and are able to do with respect to the mathematics you are studying this year. However, your school district or state department of education may ask you to take tests that they design to measure the achievement of all students, classes, or schools in the district or state. Colleges also use external standardized tests, like the ACT and SAT, to compare the knowledge of different students applying for admission or scholarships.

External standardized tests usually present assessment tasks in formats that can easily be scored to produce simple percent-correct ratings of your knowledge. If you want to perform well on such standardized tests, it helps to have some practice with test items in multiple-choice formats. The following ten sets of multiple-choice tasks have been designed to give you that kind of practice and to offer some strategic advice in working on such items.

Summarized below are test-taking strategies developed in the Course 2 RAP book.

- Work backwards from choices.
- If a diagram is not provided for a geometry problem, draw and label one.
- Replace variables with numbers.
- Break complex geometric shapes into simpler shapes if a particular formula cannot be remembered.
- Memorize important facts and formulas.
- Answer the easy questions first; then answer the more difficult ones.

- Use the table-building capability of your calculator to aid in reasoning with complicated function rules.
- Know the Pythagorean Theorem and how to use it.
- Be careful in applying proportional reasoning to linear relationships.
- For general problem situations, create and analyze a specific example.

Additional *Test Taking Tips* may be found at the end of each of the practice sets.

# Practice Set 1

Solve each problem. Then record the letter that corresponds to the correct answer.

1. If the length of a leg of a  $45^\circ - 45^\circ - 90^\circ$  triangle is 5 cm, how many centimeters long is the hypotenuse?

(a) 5            (b)  $5\sqrt{2}$             (c)  $5\sqrt{3}$             (d) 10            (e) 25

2. Which one of the following equations matches the graph below?

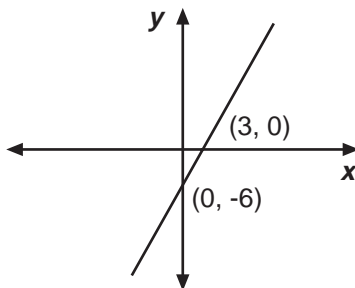
(a)  $y = -2x - 6$

(b)  $y = 3x - 6$

(c)  $y = -6x - 2$

(d)  $y = -2x - 3$

(e)  $y = 2x - 6$



3.  $|-9| - 3|-2| + |-6| =$

(a) -21            (b) -9            (c) -6

(d) 9            (e) 21

4. Given the lengths shown, in inches, find the length, in inches, of the third side of the triangle.

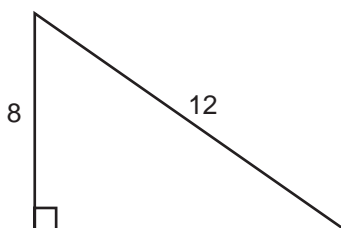
(a)  $2\sqrt{5}$

(b) 4

(c)  $4\sqrt{5}$

(d)  $8\sqrt{5}$

(e)  $4\sqrt{13}$



5. Multiply  $x^2y^3z^5 \cdot 2xy^2z^5$ .

(a)  $x^4y^7z^{15}$

(b)  $2x^2y^5z^{10}$

(c)  $2x^3y^5z^{10}$

(d)  $2x^3y^6z^{10}$

(e)  $2x^2y^6z^{25}$

# Practice Set 1

6. Which of the following expressions is *not* equivalent to  $4(7 + x)$ ?

- (a)  $(7 + x)4$
- (b)  $4(x + 7)$
- (c)  $(x + 7)4$
- (d)  $7(4 + x)$
- (e)  $4x + 28$

7. If  $x + y = 9$  and  $y - x = 7$ , then  $x^2 + y^2 =$

- (a) 1
- (b) 2
- (c) 8
- (d) 63
- (e) 65

8. If  $\begin{bmatrix} 2 & 0 \\ x & 3 \end{bmatrix} \begin{bmatrix} 0 & 4 \\ 2 & 1 \end{bmatrix} = \begin{bmatrix} 0 & 8 \\ 6 & 9 \end{bmatrix}$ , then  $x =$

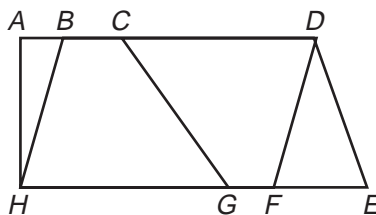
- (a)  $\frac{2}{3}$
- (b)  $\frac{3}{2}$
- (c) 3
- (d) 4
- (e) 6

9. Which of the following is a good first step in solving  $(x + 3)(x - 2) = 14$ ?

- (a) Set the sum of the factors equal to 14.
- (b) Set  $(x + 3)$  equal to 2, and set  $(x - 2)$  equal to 7.
- (c) Set each factor equal to 0.
- (d) Set each factor equal to 14.
- (e) Multiply to remove the parentheses.

10. In the figure,  $\overleftrightarrow{AD} \parallel \overleftrightarrow{HE}$  and  $\overleftrightarrow{BH} \parallel \overleftrightarrow{DF}$ . Which one of the following quadrilaterals is a parallelogram?

- (a)  $ADEH$
- (b)  $CDFG$
- (c)  $BDEH$
- (d)  $BDFH$
- (e)  $CDEG$



# Practice Set 1

## Test Taking Tip

### Use your calculator to evaluate expressions.

When finding numerical answers, the form of your answer may not match any of the choices given. Use your calculator to find a decimal approximation of your answer. Then use your calculator to find the expression that has the same approximation from among the given choices.

**Example** Look back at Item 4 on page 89. To use this strategy, first use the Pythagorean Theorem to determine that the length of the third side is  $\sqrt{144 - 64} = \sqrt{80}$ . The decimal approximation of this is 8.94427.

For choice (a):  $2\sqrt{5} \approx 4.472136$ .

For choice (c):  $4\sqrt{5} \approx 8.94427$ .

So, the answer is (c).

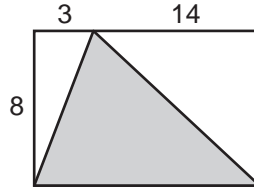
- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 2

Solve each problem. Then record the letter that corresponds to the correct answer.

1. The rectangle below has lengths as marked, in units. What is the area, in square units, of the shaded triangle if it is enclosed in the rectangle as shown?

- (a) 25
- (b) 34
- (c) 50
- (d) 68
- (e) 136



2. Of a sample of 100 Bedford High School juniors who were asked the questions:

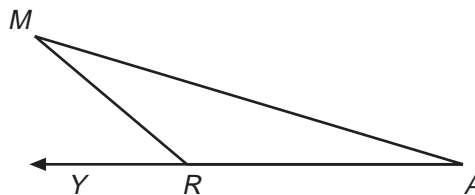
- 1. Are you planning to go to college?
- 2. Are you enrolled in a math class?

Twelve students answered “no” to both questions, 75 answered “yes” to Question 1, and 80 answered “yes” to Question 2. How many answered “yes” to both questions?

- (a) 5
- (b) 43
- (c) 55
- (d) 67
- (e) 88

3. If the measure of  $\angle MRY = 65^\circ$  and the measure of  $\angle AMR = 40^\circ$ , find the measure of  $\angle MAR$ .

- (a)  $25^\circ$
- (b)  $40^\circ$
- (c)  $55^\circ$
- (d)  $105^\circ$
- (e)  $115^\circ$



## Practice Set 2

4. Given a bag with 8 red candies, 5 yellow candies, 3 blue candies, and 6 green candies, find the probability of drawing a red candy from the bag on the first draw.
- (a)  $\frac{1}{8}$
  - (b)  $\frac{4}{11}$
  - (c)  $\frac{8}{21}$
  - (d)  $\frac{4}{7}$
  - (e)  $\frac{7}{11}$
5. If  $x$  is 50 percent of  $y$  and  $y$  is 50 percent of  $z$ , then  $z$  is what percent of  $x$ ?
- (a) 25%
  - (b) 50%
  - (c) 100%
  - (d) 125%
  - (e) 400%
6. In a group of 200 students, more students are taking Spanish than are taking German. If 120 students are taking Spanish and 40 are taking neither Spanish nor German, what is the maximum number of students who could be taking both languages?
- (a) 39
  - (b) 59
  - (c) 79
  - (d) 119
  - (e) 159
7.  $\triangle PQR$  has vertices  $P(-3, 2)$ ,  $Q(-1, 5)$ , and  $R(3, 2)$ . What is the area of  $\triangle PQR$  in square units?
- (a) 6
  - (b) 9
  - (c) 12
  - (d) 15
  - (e) 18

# Practice Set 2

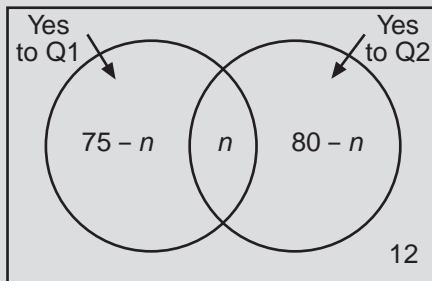
8. If  $x < 0$ , which of the following must be true?
- (a)  $x - 3 < 3x$
  - (b)  $x - 3 < 3 - x$
  - (c)  $-3x < x^2$
  - (d)  $x^3 > x + 3$
  - (e)  $x - 3 > x + 3$
9.  $\boxed{a|b|c|d|e}$  is a *mean number strip* if  $b$  is the arithmetic mean of  $a$  and  $c$ ,  $c$  is the mean of  $b$  and  $d$ , and  $d$  is the mean of  $c$  and  $e$ . If  $\boxed{2|5|c|d|e}$  is a mean number strip, what is the value of  $e$ ?
- (a) 8
  - (b) 12
  - (c) 14
  - (d) 16
  - (e) 20
10. What is the value of  $f(-2)$  when  $f(x) = (3x - 1)(x^2 - 10x + 6)$ ?
- (a) -210
  - (b) -154
  - (c) -150
  - (d) -35
  - (e) -17

# Practice Set 2

## Test Taking Tip

Use Venn diagrams to aid in reasoning about counting problems.

**Example** Look back at Item 2 on page 92. To use this strategy, draw and label a Venn diagram as shown below.



The number of students  $n$  that answered “yes” to both questions is represented by the region where the two circles overlap. Then the number of students who answered “yes” to only Question 1 is  $75 - n$ , and the number who answered “yes” to only Question 2 is  $80 - n$ . Since 12 students answered “no” to both questions, it must be the case that:

$$100 = (75 - n) + n + (80 - n) + 12 = 167 - n.$$

$$\text{So, } n = 67.$$

The correct answer is (d).

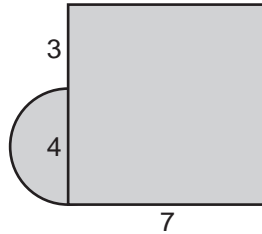
- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 3

Solve each problem. Then record the letter that corresponds to the correct answer.

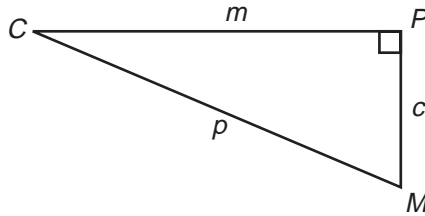
1. A semicircle is joined to a square as shown in the figure below, with lengths given in units. What is the area, in square units, of the figure?

- (a)  $28 + 4\pi$
- (b)  $28 + 8\pi$
- (c)  $49 + 2\pi$
- (d)  $49 + 4\pi$
- (e)  $49 + 16\pi$



2. In the right triangle below, which ratio represents the tangent of  $\angle C$ ?

- (a)  $\frac{c}{m}$
- (b)  $\frac{m}{c}$
- (c)  $\frac{c}{p}$
- (d)  $\frac{m}{p}$
- (e)  $\frac{p}{c}$



3. In a rectangle, the sides have measurements of  $2x + 1$  and  $3x - 5$  units. Find an expression for the area of the rectangle, in square units.

- (a)  $5x + 4$
- (b)  $5x - 5$
- (c)  $6x^2 - 5$
- (d)  $6x^2 - 7x - 5$
- (e)  $6x^2 - 13x - 5$

4. A person has to be at least 4.5 feet tall to ride the Raptor at Cedar Point. If  $t$  represents height in inches, which of the following inequalities represents this situation?

- (a)  $t \geq 4.5$
- (b)  $t \leq 4.5$
- (c)  $t < 54$
- (d)  $t > 54$
- (e)  $t \geq 54$

## Practice Set 3

5. If, for any number,  $k$ ,  $k^* = k + 2$  and  $*k = k - 2$ , which of the following is *not* equal to  $(*6)(4^*)$ ?
- (a)  $(*10)(1^*)$
  - (b)  $(10^*)(*4)$
  - (c)  $*14 + 10^*$
  - (d)  $2(10^*)$
  - (e)  $(*4)(12^*)$
6. Find the expression that represents all solutions for  $|2x - 1| < 3$ .
- (a)  $x < 2$
  - (b)  $2 < x < -1$
  - (c)  $-1 < x < 2$
  - (d)  $x > 0$
  - (e)  $x > 2$
7. If  $x > 0$  and  $x \cdot x \cdot x \cdot x = x + x + x + x$ , what is the value of  $x$ ?
- (a)  $\frac{1}{4}$
  - (b) 1
  - (c)  $\sqrt{2}$
  - (d)  $\sqrt[3]{4}$
  - (e) 4
8. If  $4x - 12 = 10$ , what is the value of  $x - 3$ ?
- (a) 2.5
  - (b) 3.3
  - (c) 4.75
  - (d) 5.5
  - (e) 6

## Practice Set 3

9. If  $4x - 3y = 11$  and  $-5x + 2y = -12$ , then the solution  $(x, y)$  is:

(a)  $(-2, 11)$

(b)  $(2, -1)$

(c)  $\left(\frac{14}{5}, 1\right)$

(d)  $\left(3, \frac{1}{3}\right)$

(e)  $(6, -1)$

10. In factored form, the quadratic equation  $2x^2 + kx + 12 = 0$  can be written as  $(2x - 3)(x - 4) = 0$ . What must be the value of  $k$ ?

(a)  $-11$

(b)  $-8$

(c)  $-5$

(d)  $-3$

(e)  $11$

# Practice Set 3

## Test Taking Tip

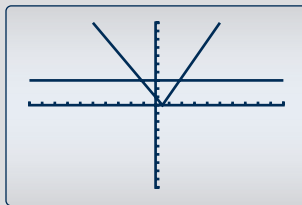
### Use graphs to solve equations and inequalities.

If you aren't sure how to solve an equation or inequality by reasoning with the symbols themselves, you may still be able to estimate the solution with a graph.

**Example** Look back at Item 6 on page 97. To use this strategy, put the expression on each side of the inequality into the function menu. Then look at the graphs.

$$y_1 = \text{abs}(2x - 1)$$

$$y_2 = 3$$



From the graph, you can see that the absolute value graph is below the graph of  $y = 3$  for  $x$ -values between  $-1$  and  $2$ . So, the answer is (c).

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 4

Solve each problem. Then record the letter that corresponds to the correct answer.

1. If the radius of a circle is 10 units, what is the measure of the circumference in units?

- (a)  $10\pi$
- (b)  $20\pi$
- (c)  $10\pi^2$
- (d)  $100\pi$
- (e)  $20\pi^2$

2. In an isosceles triangle, the congruent sides are each 5 cm long. The base is 8 cm. What is the area, in square centimeters, of the triangle?

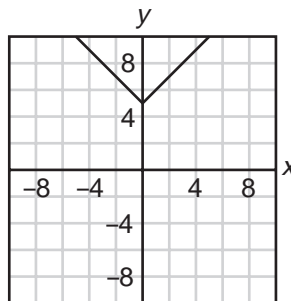
- (a) 12
- (b) 18
- (c) 20
- (d) 24
- (e) 40

3. If  $m = 2$ ,  $a = 7$ , and  $r = 4$ , what is the value of  $am^2 + \frac{r^3}{2}$ ?

- (a) 36
- (b) 43
- (c) 60
- (d) 153
- (e) 228

4. Choose the correct equation for the graph given.

- (a)  $y = |x + 5|$
- (b)  $y = |x| + 5$
- (c)  $y = |x - 5|$
- (d)  $y = |x|$
- (e)  $y = |x| - 5$



# Practice Set 4

5. Suppose you roll two dice until you get a sum of 11. The probability you will get a sum of 11 for the first time on the third roll is

(a)  $\frac{17}{5,832}$

(b)  $\frac{289}{5,832}$

(c)  $\frac{35}{46,656}$

(d)  $\frac{1,225}{46,656}$

(e)  $\frac{1}{18}$

6. Using the triangle at the right, the sine of the smallest angle is:

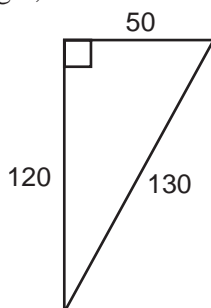
(a)  $\frac{5}{12}$

(b)  $\frac{5}{13}$

(c)  $\frac{12}{13}$

(d)  $\frac{12}{5}$

(e)  $\frac{13}{5}$



7. If  $x + y = 5$  and  $x^2 + 3xy + 2y^2 = 40$ , what is  $x + 2y$ ?

(a) 5

(b) 6

(c) 7

(d) 8

(e) 9

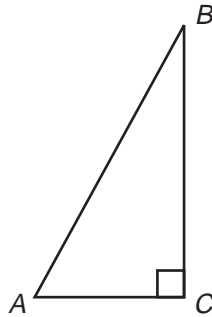
# Practice Set 4

8. If  $\frac{3x}{7} = 9$ , what is the value of  $\frac{x}{3}$ ?

- (a)  $\frac{7}{9}$
- (b)  $\frac{9}{7}$
- (c) 7
- (d) 21
- (e) 63

9. In right triangle  $ABC$  below, the cosine of  $\angle A$  is  $\frac{3}{7}$ . What is the sine of  $\angle A$ ?

- (a)  $2\sqrt{10}$
- (b)  $\frac{2\sqrt{10}}{3}$
- (c)  $\frac{2\sqrt{10}}{7}$
- (d)  $\frac{3\sqrt{40}}{40}$
- (e)  $\frac{7\sqrt{40}}{40}$



10. What is the slope of a line that is perpendicular to the line with equation  $2y + 7x = 14$ ?

- (a)  $-\frac{7}{2}$
- (b)  $\frac{1}{7}$
- (c)  $\frac{2}{7}$
- (d)  $\frac{7}{2}$
- (e) 7

# Practice Set 4

## Test Taking Tip

**Know and be able to use the definitions of the sine, cosine, and tangent ratios.**

Questions about right triangles often involve sines, cosines, and tangents in some way. Sometimes you are asked to calculate one of the trigonometric ratios; at other times, you need to observe that the calculation of a trigonometric ratio is necessary. Your calculator has built-in trigonometric functions that can be used to obtain approximate values.

**Example** Look back at Item 9 on page 102. The expression for sine of angle  $A$  requires the length of side  $BC$  since

$$\sin A = \frac{\text{side opposite}}{\text{hypotenuse}}. \quad BC^2 = 7^2 - 3^2 \text{ by the Pythagorean Theorem.}$$

$$\text{Thus, } BC = \sqrt{40} \text{ and } \sin A = \frac{\sqrt{40}}{7} = \frac{2\sqrt{10}}{7}. \text{ So, the answer is (c).}$$

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 5

Solve each problem. Then record the letter that corresponds to the correct answer.

1. If  $a > 0$  and  $b > 0$  and the slope of the line passing through  $(-2a, a)$  and  $(b, 3a)$  is 2, which of the following is an expression for  $b$  in terms of  $a$ ?

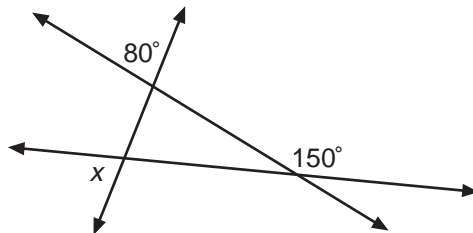
- (a)  $-a$
- (b)  $-2a$
- (c)  $-2a - 2$
- (d)  $3a$
- (e)  $4a$

2. Olivia is planning the Mathematics Club annual picnic. She may choose from 3 meat selections, 4 types of vegetables, and 5 kinds of cookies. How many different menus, each with a meat, a vegetable, and a cookie, could she select?

- (a) 12
- (b) 17
- (c) 23
- (d) 35
- (e) 60

3. In the figure shown, determine the value of  $x$ .

- (a)  $10^\circ$
- (b)  $30^\circ$
- (c)  $50^\circ$
- (d)  $70^\circ$
- (e)  $80^\circ$



## Practice Set 5

4. A school's honor society has 150 members: 70 boys and 80 girls, of whom 40 are juniors and 110 are seniors. What is the smallest possible number of senior girls in the society?
- (a) 0  
(b) 20  
(c) 40  
(d) 60  
(e) 80
5. If  $3x^2 + 10x - 8 = 0$ , what are the two solutions?
- (a)  $x = -2$  and  $x = -4$   
(b)  $x = 2$  and  $x = 4$   
(c)  $x = \frac{2}{3}$  and  $x = 4$   
(d)  $x = \frac{2}{3}$  and  $x = -4$   
(e)  $x = -\frac{2}{3}$  and  $x = -4$
6. If  $p + q = 5$  and  $2pq = 8$ , what is  $p^2 + q^2$ ?
- (a) 1  
(b) 3  
(c) 9  
(d) 13  
(e) 17
7. If  $\sqrt{k}$  is an integer, which of the following must be integers?
- I.  $\sqrt{\frac{k}{4}}$       II.  $(\sqrt{5k})^2$       III.  $\sqrt{9k}$
- (a) None  
(b) I and II only  
(c) I and III only  
(d) II and III only  
(e) I, II, and III

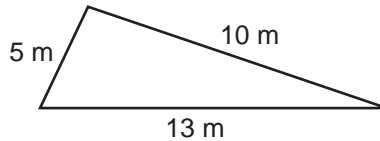
# Practice Set 5

8. If  $m^2 - 4n^2 = 32$  and  $m + 2n = 8$ , what is the value of  $m - 2n$ ?

- (a)  $-4$
- (b)  $\frac{1}{4}$
- (c)  $2$
- (d)  $4$
- (e)  $16$

9. The lengths of the sides of a triangle are 5 meters, 10 meters, and 13 meters, as depicted in the diagram. What is the cosine of the smallest of the triangle's three angles?

- (a)  $\frac{-244}{260}$
- (b)  $\frac{-10}{13}$
- (c)  $\frac{5}{13}$
- (d)  $\frac{10}{13}$
- (e)  $\frac{244}{260}$



10. Approximately 25% of the cars sold are red. Michael is observing cars as they drive by his house. What is the probability that he has to watch at least three cars go by in order to see a red one?

- (a) 0.140625
- (b) 0.25
- (c) 0.4375
- (d) 0.5625
- (e) 0.75

# Practice Set 5

## Test Taking Tip

### Factoring a quadratic expression often makes a question transparent.

College entrance examination authors think it is important for students to be able to factor several simple quadratic expressions such as  $ax^2 \pm bx$ ,  $x^2 + 2ax + a^2$ , and  $x^2 - y^2$ . However, you are seldom asked directly to factor. Rather you are asked a question that is simple once you see that factoring a quadratic expression is involved.

**Example** Look back at Item 8 on page 106. To use factoring, notice that in  $m^2 - 4n^2 = 32$ , the lefthand expression is the difference of two squares,  $m^2$  and  $(2n)^2$ . Thus,  $m^2 - 4n^2 = (m + 2n)(m - 2n) = 32$ . Since  $m + 2n = 8$ ,  $m - 2n = 4$ . So the answer is (d).

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 6

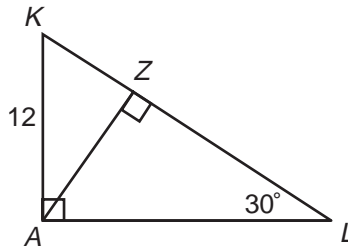
Solve each problem. Then record the letter that corresponds to the correct answer.

1. A triangle has side lengths of 9 inches, 12 inches, and 15 inches. The perimeter of a square is 24 inches. By what amount, in square inches, do the areas of these two figures differ?

- (a) 12
- (b) 18
- (c) 30
- (d) 31.5
- (e) 54

2. In the figure below,  $\triangle KAL$  and  $\triangle KZA$  are right triangles with lengths in units as marked. How many units long is  $AZ$ ?

- (a) 6
- (b)  $6\sqrt{3}$
- (c)  $12\sqrt{3}$
- (d) 18
- (e) 24



3. Which expression is equivalent to  $6c(2c+4) + 5(c - 1)$ ?

- (a)  $40c$
- (b)  $12c^2 + 24c$
- (c)  $12c^2 + 28c$
- (d)  $12c^2 + 29c - 5$
- (e)  $36c^2 + 5c - 1$

# Practice Set 6

4. If Joe's first four math test scores in the semester are 81, 93, 85, and 72, what score does he need on the fifth test to have an average of 85?
- (a) 83
  - (b) 85
  - (c) 88
  - (d) 91
  - (e) 94
5. In a class of 100 students, 58 have their own computers, and 77 have their own calculators. If 18 have neither a computer nor a calculator, how many students have both?
- (a) 5
  - (b) 19
  - (c) 24
  - (d) 53
  - (e) 58
6. The hypotenuse of a right isosceles triangle is 14 inches. Find the length, in inches, of a leg.
- (a) 7
  - (b)  $7\sqrt{2}$
  - (c)  $7\sqrt{3}$
  - (d) 4
  - (e)  $14\sqrt{2}$
7. If  $x > 1$ , which of the following decreases as  $x$  increases?
- I.  $1 - \sqrt{x}$                       II.  $\frac{x}{x + 1}$                       III.  $\frac{1}{1 - x}$
- (a) NONE
  - (b) I only
  - (c) II only
  - (d) I and III only
  - (e) II and III only

# Practice Set 6

8. The matrix below gives the dollar cost (in thousands) to build enclosed skywalks between several buildings in a downtown area. What is the minimum cost (in thousands of dollars) of building skywalks in order that people can walk from any building to any other using the skywalks?

(a) 7

(b) 8

(c) 9

(d) 10

(e) 11

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>A</i>	0	4	2	1	10
<i>B</i>	4	0	4	5	3
<i>C</i>	2	4	0	1	2
<i>D</i>	1	5	1	0	4
<i>E</i>	10	3	2	4	0

9. The operation  $*$  is defined as follows: For any positive numbers  $a$  and  $b$ ,  $a * b = \sqrt{a + 2\sqrt{b}}$ . Which of the following is an integer?

(a)  $4 * 9$

(b)  $5 * 4$

(c)  $7 * 16$

(d)  $16 * 9$

(e)  $9 * 25$

10. Which of the following describes all the values of  $x$  that satisfy  $5 - 2(3 - x) \geq 5x - 3(x - 1)$ ?

(a) All real numbers

(b)  $x < -1$

(c)  $x \geq \frac{1}{2}$

(d)  $x \leq \frac{1}{2}$

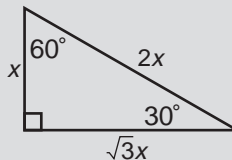
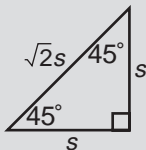
(e) No real numbers

# Practice Set 6

## Test Taking Tip

**Memorize the relationships among the sides of  $45^\circ-45^\circ-90^\circ$  triangles and  $30^\circ-60^\circ-90^\circ$  triangles.**

Questions on standardized tests often involve special right triangles:  $45^\circ-45^\circ-90^\circ$  and  $30^\circ-60^\circ-90^\circ$ . You should memorize the relationships among the sides of each type of triangle as indicated in the diagram below.



**Example** Look back at Item 2 on page 108. Since  $\triangle KAL$  is  $30^\circ-60^\circ-90^\circ$ , so is  $\triangle KAZ$ . Since  $KA = 12$  or  $6 \cdot 2$ ,  $AZ = 6 \cdot \sqrt{3}$ . So the answer is (b).

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 7

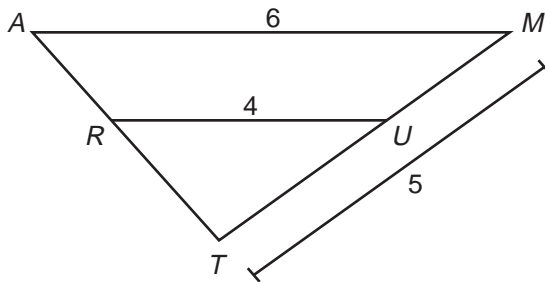
Solve each problem. Then record the letter that corresponds to the correct answer.

1. The area of a circle is  $81\pi$  square inches. What is its circumference in inches?

- (a) 9
- (b)  $4.5\pi$
- (c)  $6\pi$
- (d)  $9\pi$
- (e)  $18\pi$

2. In the figure below,  $\overleftrightarrow{AM}$  is parallel to  $\overleftrightarrow{RU}$ . Use the measurements, given in inches, to find the length, in inches, of  $\overline{TU}$ .

- (a) 3
- (b)  $\frac{10}{3}$
- (c) 4
- (d)  $\frac{11}{2}$
- (e)  $\frac{15}{2}$



3. To play one of the games at a school carnival, you are blindfolded and then you draw one of 50 plastic eggs out of a basket. The color of the egg determines how much you win or lose. There are 15 red eggs for which you win  $50\text{¢}$ . There are 10 blue eggs for which you win  $\$1.00$ . There are 25 yellow eggs for which you *pay*  $25\text{¢}$ . What are the expected winnings for this game?

- (a)  $0.094\text{¢}$
- (b)  $22.5\text{¢}$
- (c)  $35\text{¢}$
- (d)  $47.5\text{¢}$
- (e)  $\$11.25$

# Practice Set 7

4. In one month, 1,560 people purchased action and/or comedy videos at a discount store. 807 people purchased both action and comedy videos, 430 people purchased just action videos. How many people purchased just comedy videos?

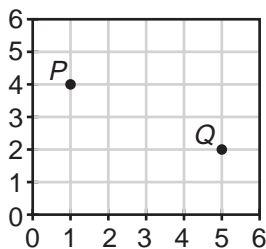
- (a) 323
- (b) 377
- (c) 753
- (d) 1,130
- (e) Impossible to determine from the information given

5.  $\frac{56c^5d^2e}{-14c^7de^3} =$

- (a)  $-4c^2de^2$
- (b)  $\frac{-4d}{c^2e^2}$
- (c)  $\frac{-4c^2e^2}{d}$
- (d)  $\frac{-4}{c^2d^2e}$
- (e)  $42c^2de^2$

6. On the grid, which of the following points is the same distance from  $P(1, 4)$  as it is from  $Q(5, 2)$ ?

- (a) (2, 2)
- (b) (5, 5)
- (c) (2, 1)
- (d) (1, 2)
- (e) (3, 4)



# Practice Set 7

7. If, for any number  $b$ ,  $b\# = 2b$  and  $\#b = \frac{b}{2}$ , which of the following is *not* equal to  $(\#18)(2\#)$ ?
- (a)  $(9\#)(\#4)$
  - (b)  $(4\#)(\#9)$
  - (c)  $\frac{9\#}{\#1}$
  - (d)  $(9\#)(4\#)$
  - (e)  $\frac{18\#}{\#2}$
8. If  $a$ ,  $b$ , and  $c$  are nonzero numbers, and  $6a = 8b$  and  $4b = 9c$ , then what is  $\frac{a}{c}$ ?
- (a)  $\frac{1}{3}$
  - (b)  $\frac{1}{2}$
  - (c)  $\frac{3}{4}$
  - (d)  $\frac{3}{2}$
  - (e) 3
9. If the endpoints of a diameter of a circle are  $A(2, 10)$  and  $B(-4, 2)$ , where is the center of the circle?
- (a)  $(3, 4)$
  - (b)  $(-1, 4)$
  - (c)  $(3, 6)$
  - (d)  $(-2, 5)$
  - (e)  $(-1, 6)$
10. How many different numbers are solutions for the equation  $5x + 17 = (x + 4)(x + 5)$ ?
- (a) 0
  - (b) 1
  - (c) 2
  - (d) 3
  - (e) Infinitely many

# Practice Set 7

## Test Taking Tip

**Eliminate options that are obviously incorrect; concentrate on the viable options.**

Test makers often want you to determine one expression that is equivalent to a given one that may be rather complex. It takes time to do all the calculations, so you should seek clues that eliminate several of the options. To do this, look at the complex expression to determine its general characteristics (Is it quadratic? Is it cubic?), and then use these characteristics to eliminate options and, perhaps, to identify the correct option.

**Example** Look back at Item 10 on page 114. The given expression, when all like terms are combined, is a quadratic. You know a quadratic can have no more than two distinct solutions, so options (d) and (e) are eliminated. Since the condensed form,  $x^2 + 4x + 3$ , is not a perfect square, there is no duplication of roots. So there are exactly two different solutions. Option (c) is correct.

- Look back at Practice Sets 1 through 7 and find other test items for which eliminating obviously incorrect options might be helpful.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 8

Solve each problem. Then record the letter that corresponds to the correct answer.

- Two triangles are similar. The lengths of the sides of one triangle are 4, 9, and 11 units. The smallest side of the other triangle is 6 units. What is the perimeter, in units, of the larger triangle?
  - 24
  - 26
  - 30
  - 36
  - 46
- Given that the longer leg of a  $30^\circ-60^\circ-90^\circ$  triangle measures 6 units, find the length, in units, of the hypotenuse.
  - 3
  - $2\sqrt{3}$
  - $4\sqrt{3}$
  - $6\sqrt{3}$
  - 12
- The radius of a circle is decreased by 20%. By what percent will the area be decreased?
  - 20%
  - 36%
  - 40%
  - 60%
  - 64%

# Practice Set 8

4.  $\boxed{a|b|c|d|e}$  is a *mean number strip* if  $b$  is the arithmetic mean of  $a$  and  $c$ ,  $c$  is the mean of  $b$  and  $d$ , and  $d$  is the mean of  $c$  and  $e$ . If  $\boxed{a|b|c|d|e}$  is a mean number strip, which of the following is an expression for  $e$  in terms of  $a$  and  $b$ ?

(a)  $\frac{a + b + c + d}{8}$

(b)  $\frac{a + b + c + d}{4}$

(c)  $\frac{a + b}{2}$

(d)  $4b - 3a$

(e)  $7b - 10a$

5. In the starlike figure below, what is the value of  $x$ ?

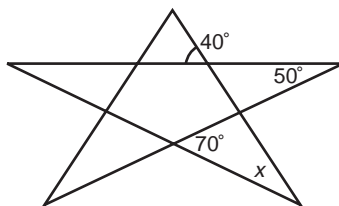
(a)  $20^\circ$

(b)  $25^\circ$

(c)  $30^\circ$

(d)  $40^\circ$

(e)  $50^\circ$



6. If  $x^2 - 9 = (x + p)(x - p)$  for all values of  $x$ , which of the following could be the value of  $p$ ?

(a) 1

(b) 2

(c) 3

(d) 4

(e) 9

# Practice Set 8

7. If  $2x - 8 = 1$ , what is the value of  $x - 4$ ?

(a)  $-\frac{1}{2}$

(b)  $\frac{1}{2}$

(c) 4

(d) 8

(e)  $8\frac{1}{2}$

8. Jim earns  $x$  dollars in  $h$  hours. How many dollars will he earn in  $h + 20$  hours?

(a)  $\frac{20x}{h}$

(b)  $x + \frac{20x}{h}$

(c)  $21x$

(d)  $\frac{xh}{h + 20}$

(e)  $(h + 20)x$

9. The vertex-edge graph below shows the number of minutes it takes Brianna to bicycle between the different stops on her delivery route. What is the least amount of time, in minutes, it could take her to visit each stop if she must begin and end at vertex  $A$ ?

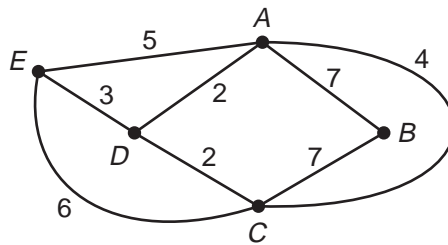
(a) 6

(b) 13

(c) 15

(d) 18

(e) 24



10. If  $18 - 3(5 - x) = x - 7$ , then  $x =$

(a)  $-8$

(b)  $-5$

(c)  $-1$

(d) 5

(e) 10

# Practice Set 8

## Test Taking Tip

**When considering relations among similar shapes, be sure to identify the dimensions of the aspects being compared.**

When two shapes are similar with a scale factor of  $k$ , corresponding linear measures are related by the factor  $k$ . However, when areas or volumes are compared, the areas are related by a factor of  $k^2$ , and the volumes are related by a factor of  $k^3$ . Be sure you know whether the measures being compared are for line segments, plane regions, or space regions.

**Example** Look back at Item 1 on page 116. The triangles are given as similar and the scale factor is found to be  $\frac{3}{2}$ . Now you seek the perimeter—a number that is measured in linear units—of the second triangle. Since the first triangle has a perimeter of 24, the other one has perimeter  $\frac{3}{2} \cdot 24 = 36$ . So the answer is (d). What multiplier would you use if you wanted the area of the second triangle, given the area of the first?

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 9

Solve each problem. Then record the letter that corresponds to the correct answer.

1. The endpoints of a diagonal of a square are  $(-2, 2)$  and  $(1, 5)$ . What is the area of the square?

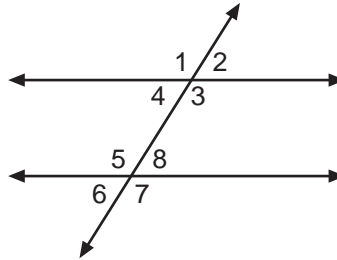
- (a) 3
- (b)  $3\sqrt{2}$
- (c) 9
- (d) 12
- (e) 18

2. Frances can type 100 pages in  $h$  hours. At this rate, how many pages can she type in  $m$  minutes?

- (a)  $\frac{mh}{60}$
- (b)  $\frac{60m}{h}$
- (c)  $\frac{100m}{60h}$
- (d)  $\frac{60h}{100m}$
- (e)  $\frac{100h}{60m}$

3. Suppose in the figure below, the measure of  $\angle 5$  is  $120^\circ$ . Find the measure of  $\angle 2$ .

- (a)  $30^\circ$
- (b)  $45^\circ$
- (c)  $60^\circ$
- (d)  $90^\circ$
- (e)  $120^\circ$



4. Which of the following is a solution to the equation  $|3x - 6| = 3$ ?

- (a)  $-2$
- (b)  $-1$
- (c) 0
- (d) 1
- (e) 2

# Practice Set 9

5. At a speed of 48 miles per hour, how many minutes will it take to drive 40 miles?

(a)  $\frac{5}{8}$

(b)  $\frac{8}{5}$

(c) 32

(d) 50

(e) 1,920

6. If  $a < 0$  and  $b < 0$ , which of the following must be less than 0?

I.  $a + b$

II.  $a \cdot b$

III.  $-\frac{a}{b}$

(a) None

(b) I and II only

(c) I and III only

(d) II and III only

(e) I, II, and III

7. If  $\frac{n}{6} = 8$ , what is the value of  $\frac{n}{8}$ ?

(a) 6

(b)  $\frac{4}{3}$

(c)  $\frac{3}{4}$

(d)  $\frac{1}{6}$

(e) 2

# Practice Set 9

8. For nonzero numbers  $x$ ,  $y$ , and  $z$ ,  $3x = 4y$  and  $12y = 5z$ . What is  $\frac{z}{x}$ ?

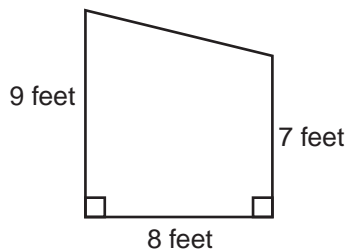
- (a) 4
- (b)  $\frac{16}{5}$
- (c)  $\frac{9}{5}$
- (d)  $\frac{6}{5}$
- (e)  $\frac{5}{16}$

9. On standardized tests like the ACT and SAT, every question is worth the same amount: one point. Assume there are five choices, A–E, for each item. Suppose you got bogged down on some questions and, with a minute left, you still have ten questions to answer. If you guess on each question and there is no guessing penalty, what is your expected score on the last ten items of the test?

- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) 5

10. The following sketch shows a shed wall. What is the area of the surface of this wall, in square feet?

- (a) 24
- (b) 56
- (c) 64
- (d) 72
- (e) 504



# Practice Set 9

## Test Taking Tip

### Pay attention to units used in a problem.

Often the answer to a question must be in units different than those used in the statement of the problem. Be sure to read problems carefully and make the necessary conversions.

**Example** Look back at Item 5 on page 121. The speed is given in miles per hour, but the question asks for an answer in minutes. First determine the time it will take in hours, then do the necessary conversion. Since  $t = \frac{d}{r}$ ,  $d = 40$  miles, and  $r = 48$  mph, you have  $t = \frac{40}{48}$  hours. But,  $\frac{40}{48}$  hours =  $\frac{40}{48}$  hours  $\cdot \frac{60 \text{ min}}{1 \text{ hour}} = \frac{2,400}{48}$  min or 50 minutes. So the correct answer is (d).

- Find, if possible, another test item in the practice set for which this strategy might be helpful. Try it.
- Keep this strategy in mind as you work on future practice sets.

# Practice Set 10

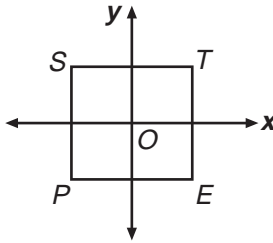
Solve each problem. Then record the letter that corresponds to the correct answer.

1. The side length of a square is  $w$  units. Its area is 8 square units. Find the area, in square units, of a square if its side is  $4w$  units long.

- (a) 16
- (b) 25
- (c) 32
- (d) 128
- (e) 168

2. In the figure below,  $O$  is the center of square  $STEP$  with sides parallel to the axes. If the sum of the coordinates of  $T$  is 12, what is the sum of the coordinates of  $E$ ?

- (a)  $-12$
- (b)  $-6$
- (c) 0
- (d) 6
- (e) 12



3. If a car can be driven 45 miles on 2 gallons of gasoline, how many gallons of gasoline will it take to travel 315 miles?

- (a) 3.5
- (b) 7
- (c) 9
- (d) 14
- (e) 16

# Practice Set 10

4. If  $y = x + 4$ , what is the value of  $|y - x| + |x - y|$ ?

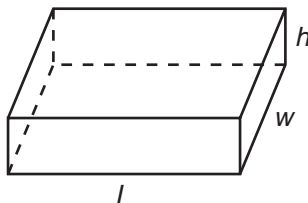
- (a) 0
- (b) 2
- (c) 4
- (d) 8
- (e) 16

5. Which is the equation of a line parallel to  $3x - 4y = 12$ ?

- (a)  $y = 3x + 5$
- (b)  $y = -\frac{3}{4}x + 8$
- (c)  $y = \frac{3}{4}x - 6$
- (d)  $y = \frac{4}{3}x - 3$
- (e)  $y = -\frac{4}{3}x + 12$

6. For the rectangular concrete block shown, measures  $l$ ,  $w$ , and  $h$  are unequal. The diagonals of the faces of the block have how many different lengths?

- (a) One
- (b) Two
- (c) Three
- (d) Four
- (e) Twelve



# Practice Set 10

7. Suppose on a standardized multiple-choice test with five choices, each question is worth the same amount: 1 point. To counter guessing, a guessing penalty of  $\frac{1}{4}$  of a point is applied to each incorrect answer. Suppose on each of the last ten items, you were able to eliminate two choices, but did not have time to complete solutions of any of the items. If you chose to answer none of them, your score on the ten items is 0. If you guess on each of the questions, what is your expected score on the ten items?

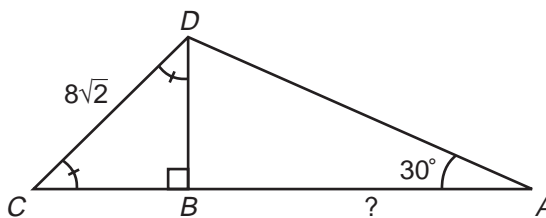
- (a) 0  
 (b)  $\frac{1}{3}$   
 (c)  $\frac{2}{3}$   
 (d)  $\frac{5}{3}$   
 (e)  $\frac{15}{4}$

8. If  $n$  is a negative integer, how do  $(-2)^{2n}$  and  $(-2)^{2n+1}$  compare?

- (a)  $(-2)^{2n} > (-2)^{2n+1}$   
 (b)  $(-2)^{2n} < (-2)^{2n+1}$   
 (c)  $(-2)^{2n+1} \geq (-2)^{2n}$   
 (d)  $(-2)^{2n} = (-2)^{2n+1}$   
 (e) Cannot be determined from the given information.

9. Suppose that  $\triangle BCD$  is isosceles,  $CD = 8\sqrt{2}$ , and  $m\angle A = 30^\circ$ . What is the length of  $AB$ ?

- (a)  $4\sqrt{6}$   
 (b) 8  
 (c)  $8\sqrt{2}$   
 (d)  $8\sqrt{3}$   
 (e) 16



10. A bag contains 10 marbles, 3 of which are red, 2 of which are blue, and 5 of which are yellow. You reach in and draw two marbles. What is the probability that both marbles are blue?

- (a)  $\frac{2}{100}$   
 (b)  $\frac{2}{90}$   
 (c)  $\frac{4}{100}$   
 (d)  $\frac{28}{90}$   
 (e)  $\frac{4}{20}$

# Practice Set 10

## Test Taking Tip

### If all else fails, it pays to make an educated guess.

Previous Test Taking Tips have offered strategies for working efficiently to produce correct answers to multiple-choice questions. Because of time constraints or the nature of some questions on standardized tests, sometimes you may not be able to produce an answer in the allotted time. In these cases, it is to your benefit to make an educated guess, after first eliminating one or two obviously incorrect choices. The ACT has no penalty for guessing. On the SAT, the penalty for guessing is a  $\frac{1}{4}$ -point or a  $\frac{1}{3}$ -point reduction for each incorrect answer, depending on the number of choices.

**Example** Suppose that a tenth-grader answered correctly 10 of the 20 questions from the last two practice sets. If he did not answer any other questions, his total score across the two sets would be 10.

- (a) If he guessed at the answer to each of the remaining questions, on average he would get  $10\left(\frac{1}{5}\right) = 2$  correct. His score then across the two sets would be 12.
- (b) If, before guessing, he was able to eliminate two choices for each item, then, on average, his score would be  $10 + 10\left(\frac{1}{3}\right) = 13\frac{1}{3}$  or, when rounded, 13 points for the two sets.
- (c) If in Part b a guessing penalty is applied, his score on average would be  $10 + 10\left(\frac{1}{3}\right) - \frac{1}{4}\left(10 \cdot \frac{2}{3}\right) = 11\frac{2}{3}$  or, when rounded, 12 points.

- For what items on this practice set might this strategy have been useful for you?
- Keep this strategy in mind as a last resort as you work on future problems of this type.

# Solutions to Practice Sets for Standardized Tests

## Practice Set 1, pp. 89–91

1. b
2. e
3. d
4. c
5. c
6. d
7. e
8. b
9. e
10. d

## Practice Set 3, pp. 96–99

1. c
2. a
3. d
4. e
5. e
6. c
7. d
8. a
9. b
10. a

## Practice Set 2, pp. 92–95

1. d
2. d
3. a
4. b
5. e
6. c
7. b
8. b
9. c
10. a

## Practice Set 4, pp. 100–103

1. b
2. a
3. c
4. b
5. b
6. b
7. d
8. c
9. c
10. c

**Practice Set 5, pp. 104–107**

1. a
2. e
3. d
4. c
5. d
6. e
7. d
8. d
9. e
10. d

**Practice Set 7, pp. 112–115**

1. e
2. b
3. b
4. a
5. b
6. c
7. d
8. e
9. e
10. c

**Practice Set 6, pp. 108–111**

1. b
2. b
3. d
4. e
5. d
6. b
7. b
8. a
9. b
10. e

**Practice Set 8, pp. 116–119**

1. d
2. c
3. b
4. d
5. a
6. c
7. b
8. b
9. e
10. b

**Practice Set 9, pp. 120–123**

1. c
2. c
3. c
4. d
5. d
6. c
7. a
8. c
9. b
10. c

**Practice Set 10, pp. 124–128**

1. d
2. c
3. d
4. d
5. c
6. c
7. d
8. a
9. d
10. b