10 ▶ Practice Test 2

This practice test is a simulation of the three Math sections you will complete on the SAT. To receive the most benefit from this practice test, complete it as if it were the real SAT. So take this practice test under test-like conditions: Isolate yourself somewhere you will not be disturbed; use a stopwatch; follow the directions; and give yourself only the amount of time allotted for each section.

When you are finished, review the answers and explanations that immediately follow the test. Make note of the kinds of errors you made and review the appropriate skills and concepts before taking another practice test.

▶ Section 1

1.	a b c d e	8.	a b c d e	15.	a b c d e
2.	a b c d e	9.	a b c d e	16.	a b c d e
3.	a b c d e	10.	a b c d e	17.	a b c d e
4.	a b c d e	11.	a b c d e	18.	a b c d e
5.	a b c d e	12.	a b c d e	19.	a b c d e
6.	a b c d e	13.	a b c d e	20.	a b c d e
7.	a b c d e	14.	a b c d e		

▶ Section 2

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

9.
10.
11.
12.
13.

14.
15.
16.
17.
18.

▶ Section 3

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2. ⓐ ⓑ ⓒ ⓓ ⓔ
3. ⓐ ⓑ ⓒ ⓓ ⓔ
4. ⓐ ⓑ ⓒ ⓓ ⓔ
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6. ⓐ ⓑ ⓒ ⓓ ⓔ

7. ⓐ ⓑ ⓒ ⓓ ⓔ
8. ⓐ ⓑ ⓒ ⓓ ⓔ
9. ⓐ ⓑ ⓒ ⓓ ⓔ
10. ⓐ ⓑ ⓒ ⓓ ⓔ
11. ⓐ ⓑ ⓒ ⓓ ⓔ
12. ⓐ ⓑ ⓒ ⓓ ⓔ

13. ⓐ ⓑ ⓒ ⓓ ⓔ
14. ⓐ ⓑ ⓒ ⓓ ⓔ
15. ⓐ ⓑ ⓒ ⓓ ⓔ
16. ⓐ ⓑ ⓒ ⓓ ⓔ

▶ Section 1

1. If $m = 6$, then the expression $\frac{m^2}{3} - 4m + 10$ is equal to
  a. −12.
  b. −2.
  c. 6.
  d. 12.
  e. 22.

2. Which of the following is the midpoint of a line with endpoints at $(-2,-8)$ and $(8,0)$?
  a. $(3,4)$
  b. $(3,-4)$
  c. $(-5,4)$
  d. $(5,-4)$
  e. $(6,-8)$

3. If $4x + 5 = 15$, then $10x + 5 =$
  a. 2.5.
  b. 15.
  c. 22.5.
  d. 25.
  e. 30.

4. A music store offers customized guitars. A buyer has four choices for the neck of the guitar, two choices for the body of the guitar, and six choices for the color of the guitar. The music store offers
  a. 12 different guitars.
  b. 16 different guitars.
  c. 24 different guitars.
  d. 36 different guitars.
  e. 48 different guitars.

5. Which of the following is the set of positive factors of 12 that are NOT multiples of 2?
  a. { }
  b. {1}
  c. {1, 3}
  d. {1, 2, 3}
  e. {2, 4, 6, 12}

6.
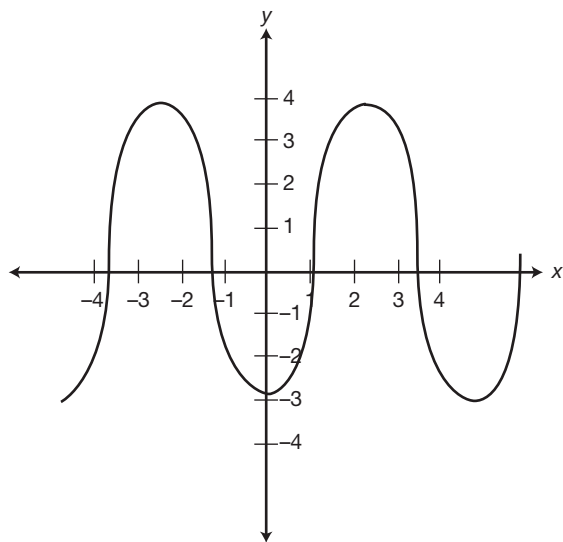
The graph of $f(x)$ is shown above. How many values can be found for $f(3)$?

a. 0

b. 1

c. 2

d. 4

e. cannot be determined

7. The expression $\frac{x^2 + 5x}{x^3 - 25x}$ can be reduced to

a. 1.

b. $\frac{5}{x^2 - 25}$.

c. $x + 5$.

d. $\frac{1}{x - 5}$.

e. $\frac{x}{x + 5}$.

8. Which of the following is the vertex of the parabola which is the graph of the equation $y = (x + 1)^2 + 2$?

a. $(-1,-2)$

b. $(1,-2)$

c. $(-1,2)$

d. $(1,2)$

e. $(2,-1)$

9. $a\frac{b}{c}$ is equivalent to

a. $\sqrt[c]{a^b}$.

b. $\sqrt[b]{a^c}$.

c. $\frac{1}{a\frac{c}{b}}$.

d. $\frac{\sqrt{a^b}}{c}$

e. $\frac{a^b}{c}$.

10. If the statement "No penguins live at the North Pole" is true, which of the following statements must also be true?

a. All penguins live at the South Pole.

b. If Flipper is not a penguin, then he lives at the North Pole.

c. If Flipper is not a penguin, then he does not live at the North Pole.

d. If Flipper does not live at the North Pole, then he is a penguin.

e. If Flipper lives at the North Pole, then he is not a penguin.

11. If $p < 0$, $q > 0$, and $r > p$, then which of the following must be true?

a. $p + r > 0$

b. $r^p < r^q$

c. $pr < rq$

d. $r + q > q$

e. $p + r < r + q$

12.

Al's Video Vault Rentals

Comedy
24%

Drama
42%
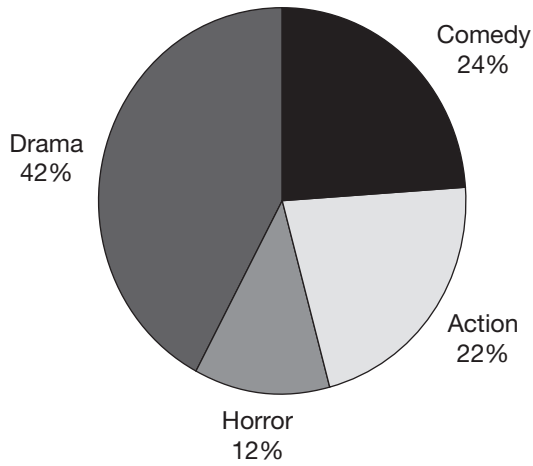
Action
22%

Horror
12%

The pie chart above shows the distribution of video rentals from Al's Video Vault for a single night. If 250 videos were rented that night, how many more action movies were rented than horror movies?

a. 10
b. 20
c. 22
d. 25
e. 30

13.
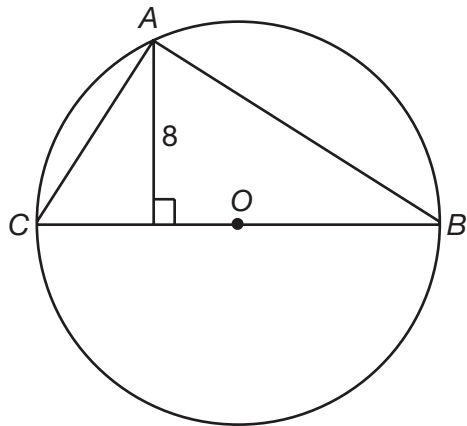
If the circumference of the circle in the diagram above is 20π units, what is the area of triangle *ABC*?

a. 40 square units
b. 80 square units
c. 80π square units
d. 160 square units
e. 160π square units

14. The area of an isosceles right triangle is 18 cm². What is the length of the hypotenuse of the triangle?

   a. 6 cm

   b. $6\sqrt{2}$ cm

   c. $18\sqrt{2}$ cm

   d. $18\sqrt{3}$ cm

   e. $36\sqrt{2}$ cm

15. If $a < \frac{43}{3x} < b$, and $a = 4$ and $b = 8$, which of the following could be true?

   a. $x < a$

   b. $x > b$

   c. $a < x < b$

   d. $4 < x < 8$

   e. none of the above

16. The length of a rectangle is one greater than three times its width. If the perimeter of the rectangle is 26 feet, what is the area of the rectangle?

   a. 13 ft²

   b. 24 ft²

   c. 30 ft²

   d. 78 ft²

   e. 100 ft²

17.
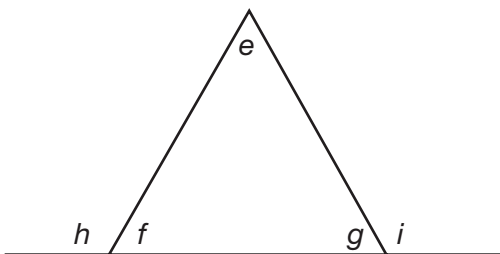
Based on the diagram above, which of the following is true?

   a. $i = e + f$

   b. $g + i = h + e$

   c. $e + i = e + h$

   d. $e + g + i = 180$

   e. $e + f + g + h + i = 360$

18. Which of the following is an irrational number?

a. $\sqrt{\frac{4}{9}}$

b. 4^{-3}

c. $-(\sqrt{3}\ \sqrt{3})$

d. $\frac{\sqrt{72}}{\sqrt{200}}$

e. $(\sqrt{32})^3$

19.
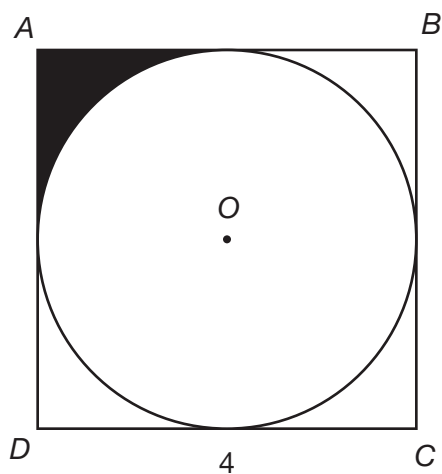
In the diagram above, the length of a side of square *ABCD* is four units. What is the area of the shaded region?

a. 4

b. $4 - \pi$

c. $4 - 4\pi$

d. 16π

e. $16 - 4\pi$

20. The value of *d* is increased 50%, then decreased 50%. Compared to its original value, the value of *d* is now

a. 25% smaller.

b. 25% larger.

c. 50% smaller.

d. 50% larger.

e. the same.

▶ Section 2

1. Which of the following expressions is undefined when $x = -2$?

   a. $y = \frac{x+2}{x-2}$

   b. $y = \frac{x^2 + 4x + 4}{x}$

   c. $y = \frac{2x+4}{x^2 - 4x + 4}$

   d. $y = \frac{x^2 + 3x + 2}{-x^2 + 2}$

   e. $y = \frac{x^2 + 2x + 2}{x^2 + 6x + 8}$

2. If graphed, which of the following pairs of equations would be parallel to each other?
   a. $y = 2x + 4$, $y = x + 4$
   b. $y = 3x + 3$, $y = -\frac{1}{3}x - 3$
   c. $y = 4x + 1$, $y = -4x + 1$
   d. $y = 5x + 5$, $y = \frac{1}{5}x + 5$
   e. $y = 6x + 6$, $y = 6x - 6$

3. If $\frac{a}{b-4} = \frac{4b}{a} + 1$, then when $a = 8$, b could be equal to
   a. -2.
   b. 4.
   c. 6.
   d. 7.
   e. 8.

4. The average of five consecutive odd integers is -21. What is the least of these integers?
   a. -17
   b. -19
   c. -21
   d. -23
   e. -25

5. Line AC is a diagonal of square $ABCD$. What is the sine of angle ACB?

   a. $\frac{1}{2}$

   b. $\sqrt{2}$

   c. $\frac{\sqrt{2}}{2}$

   d. $\frac{\sqrt{3}}{2}$

   e. cannot be determined

6. If the height of a cylinder is doubled and the radius of the cylinder is halved, the volume of the cylinder
   a. remains the same.
   b. becomes twice as large.
   c. becomes half as large.
   d. becomes four times larger.
   e. becomes four times smaller.

7. $\dfrac{\frac{b}{a} - a}{\frac{1}{a^{-1}}} =$

   a. b

   b. $b - a^2$

   c. $\dfrac{b}{a} - 1$

   d. $\dfrac{b}{a^2} - 1$

   e. $\dfrac{b}{a^2} - a$

8. The ratio of the number of cubic units in the volume of a cube to the number of square units in the surface area of the cube is 2:3. What is the surface area of the cube?
   a. 16 square units
   b. 24 square units
   c. 64 square units
   d. 96 square units
   e. 144 square units

9. If a number is chosen at random from a set that contains only the whole number factors of 24, what is the probability that the number is either a multiple of four or a multiple of six?

10. There are 750 students in the auditorium for an assembly. When the assembly ends, the students begin to leave. If 32% of the students have left so far, how many students are still in the auditorium?

11. If point A is at $(-1,2)$ and point B is at $(11,-7)$, what is length of line AB?

12. Robert is practicing for the long jump competition. His first four jumps measure 12.4 ft, 18.9 ft, 17.3 ft, and 15.3 ft, respectively. If he averages 16.3 feet for his first five jumps, what is the length in feet of his fifth jump?

13. There are seven students on the trivia team. Mr. Randall must choose four students to participate in the trivia challenge. How many different groups of four students can Mr. Randall form?

14.

Sales of the Greenvale and Smithtown Branches of SuperBooks
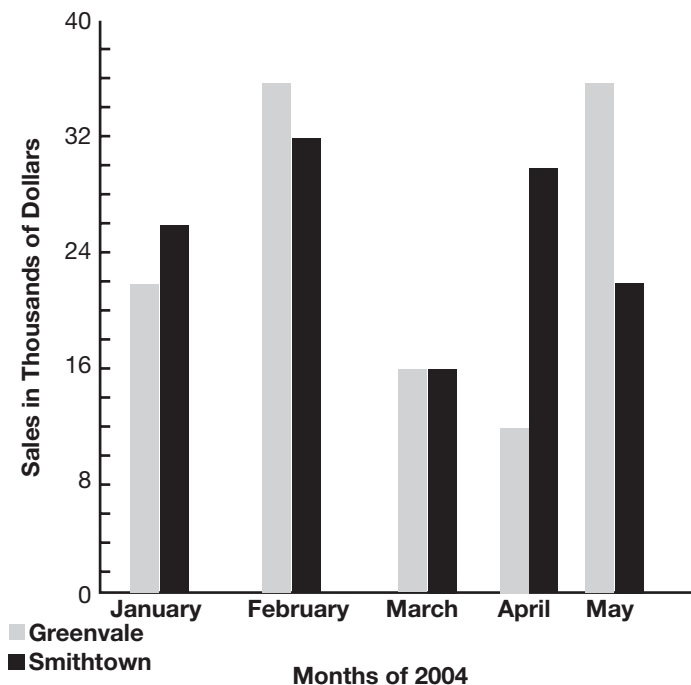
The graph above shows the sales by month for the Greenvale and Smithtown branches of SuperBooks. From January through May, how much more money did the Smithtown branch gross in sales than the Greenvale branch?

15.
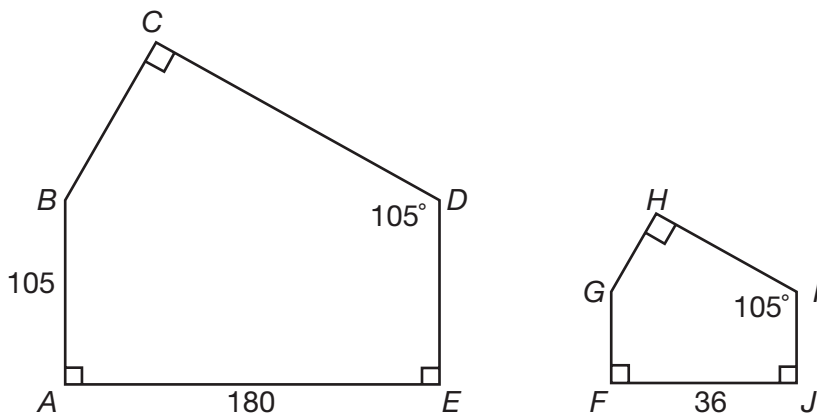
In the diagram above, what is the length of side *FG*?

16. DeDe and Mike both run the length of a two-mile field. If DeDe runs 5 mph and Mike runs 6 mph, how many more minutes does it take DeDe to run the field?

17. Point *A* of rectangle *ABCD* is located at (−3,12) and point *C* is located at (9,5). What is the area of rectangle *ABCD*?

18.
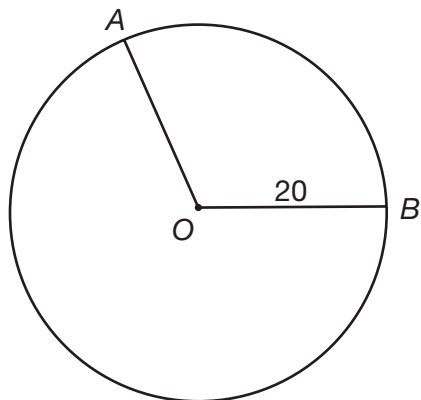
In the diagram above, the radius of the circle is 20 units and the length of arc *AB* is 15π units. What is the measure in degrees of angle *AOB*?

▶ Section 3

1. All of the following are less than $\frac{2}{5}$ EXCEPT

   a. $\frac{1}{3}$.

   b. 0.04.

   c. $\frac{3}{8}$.

   d. $\frac{3}{7}$.

   e. 0.0404.

2. If $3x - y = 2$ and $2y - 3x = 8$, which of the following is equal to $\frac{x}{y}$?

   a. $\frac{2}{3}$

   b. $\frac{2}{5}$

   c. $2\frac{1}{2}$

   d. 4

   e. 6

3. Which of the following sets of numbers contains all and only the roots of the equation $f(x) = x^3 + 7x^2 - 8x$?

  a. $\{-8, 1\}$
  b. $\{8, -1\}$
  c. $\{0, -8, 1\}$
  d. $\{0, 8, -1\}$
  e. $\{0, -1, -8, 1, 8\}$

4. What is the equation of the line that passes through the points $(2,3)$ and $(-2,5)$?

  a. $y = x + 1$
  b. $y = -\frac{1}{2}x + 4$
  c. $y = -\frac{1}{2}x$
  d. $y = -\frac{3}{2}x$
  e. $y = -\frac{3}{2}x + 2$

5. An empty crate weighs 8.16 kg and an orange weighs 220 g. If Jon can lift 11,000 g, how many oranges can he pack in the crate before lifting it onto his truck?

  a. 12
  b. 13
  c. 37
  d. 46
  e. 50

6. The measures of the length, width, and height of a rectangular prism are in the ratio 2:6:5. If the volume of the prism is 1,620 mm^3, what is the width of the prism?

  a. 3 mm
  b. 6 mm
  c. 9 mm
  d. 18 mm
  e. 27 mm

7. A box contains five blue pens, three black pens, and two red pens. If every time a pen is selected, it is removed from the box, what is the probability of selecting a black pen followed by a blue pen?

  a. $\frac{1}{6}$
  b. $\frac{1}{10}$
  c. $\frac{1}{50}$
  d. $\frac{3}{20}$
  e. $\frac{77}{90}$

8.
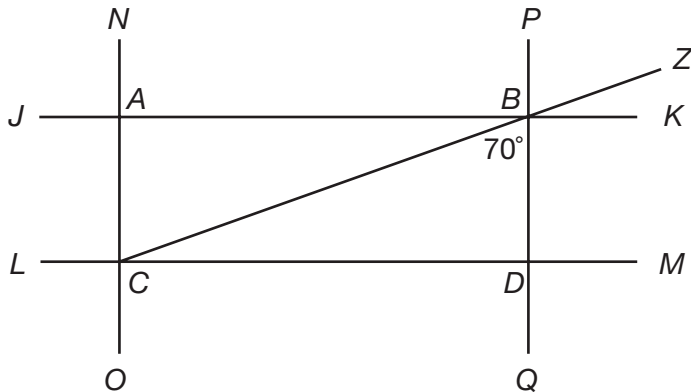
In the diagram above, lines *NO* and *PQ* are parallel to each other and perpendicular to lines *JK* and *LM*. Line *JK* is parallel to line *LM*. If angle *CBD* is 70 degrees, what is the measure of angle *ZBK*?

a. 10 degrees

b. 20 degrees

c. 70 degrees

d. 90 degrees

e. 110 degrees

9. Monica sells pretzels in the cafeteria every school day for a week. She sells 14 pretzels on Monday, 12 pretzels on Tuesday, 16 pretzels on Wednesday, and 12 pretzels on Thursday. Then, she calculates the mean, median, and mode of her sales. If she sells 13 pretzels on Friday, then

a. the mode will increase.

b. the mean will stay the same.

c. the median will stay the same.

d. the median will decrease.

e. the mean will increase.
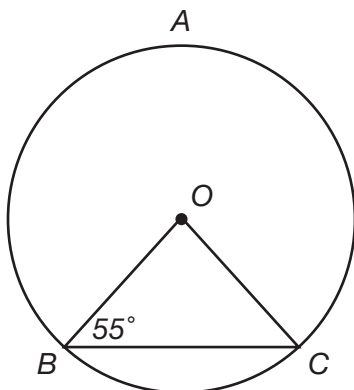
10. What is the tenth term of the pattern below?

$$\frac{10}{1,024}, \frac{9}{512}, \frac{8}{256}, \frac{7}{128}, \ldots$$

a. $\frac{1}{2}$

b. $\frac{2}{9}$

c. $\frac{9}{2}$

d. $\frac{9}{4}$

e. 1

11. Which of the following statements is always true if p is a rational number?

    a. $|p| < |3p|$

    b. $|p^2| > |p + 1|$

    c. $|-p| > p$

    d. $|p^3| > |p^2|$

    e. $|p^{-p}| > p^{-p}$

12.

In the diagram above, side $OB \cong$ side OC. Which of the following is the measure of minor arc BC?

    a. 27.5 degrees

    b. 45 degrees

    c. 55 degrees

    d. 70 degrees

    e. 110 degrees

13. If $g \wedge h = \frac{2h}{g}$, then $(h \wedge g) \wedge h =$

    a. $2h$.

    b. $4h$.

    c. $\frac{h^2}{g}$.

    d. $\frac{2h^2}{g}$.

    e. $\frac{4h^2}{g}$.

14. Four copy machines make 240 total copies in three minutes. How long will it take five copy machines to make the same number of copies?

    a. 2 minutes

    b. 2 minutes, 15 seconds

    c. 2 minutes, 24 seconds

    d. 2 minutes, 45 seconds

    e. 3 minutes, 36 seconds

15. If 40% of j is equal to 50% of k, then j is
   a. 10% larger than k.
   b. 15% larger than k.
   c. 20% larger than k.
   d. 25% larger than k.
   e. 80% larger than k.

16.
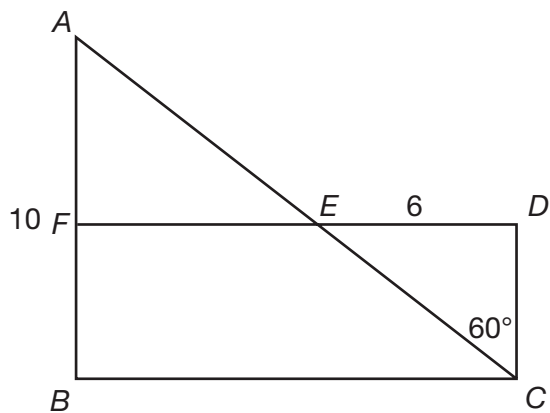
In the diagram above, *FDCB* is a rectangle. Line *ED* is six units long, line *AB* is ten units long, and the measure of angle *ECD* is 60 degrees. What is the length of line *AE*?

   a. 8
   b. $\frac{\sqrt{3}}{2}$
   c. 20
   d. $20 - \frac{\sqrt{3}}{2}$
   e. $20 - 4\sqrt{3}$

► Answer Key

Section 1 Answers

1. b. Substitute 6 for m: $\frac{6^2}{3} - 4(6) + 10 = \frac{36}{3} - 24 + 10$
$= 12 - 14 = -2$.

2. b. The midpoint of a line is equal to the average of the x- and y-coordinates of its endpoints. The average of the x-coordinates $= \frac{-2+8}{2} = \frac{6}{2} = 3$. The average of the y-coordinates $= \frac{-8+0}{2} = -\frac{8}{2} = -4$. The midpoint of this line is at $(3,-4)$.

3. e. If $4x + 5 = 15$, then $4x = 10$ and $x = 2.5$. Substitute 2.5 for x in the second equation: $10(2.5) + 5 = 25 + 5 = 30$.

4. e. To find the total number of different guitars that are offered, multiply the number of neck choices by the number of body choices by the number of color choices: $(4)(2)(6) = 48$ different guitars.

5. c. The set of positive factors of 12 is $\{1, 2, 3, 4, 6, 12\}$. All of the even numbers (2, 4, 6, and 12) are multiples of 2. The only positive factors of 12 that are not multiples of 2 are 1 and 3.

6. b. Be careful—the question asks you for the number of values of $f(3)$, not $f(x) = 3$. In other words, how many y values can be generated when $x = 3$? If the line $x = 3$ is drawn on the graph, it passes through only one point. There is only one value for $f(3)$.

7. d. Factor the numerator and denominator of the fraction:
$(x^2 + 5x) = x(x + 5)$
$(x^3 - 25x) = x(x + 5)(x - 5)$
There is an x term and an $(x + 5)$ term in both the numerator and denominator. Cancel those terms, leaving the fraction $\frac{1}{x-5}$.

8. c. The equation of a parabola with its turning point c units to the left of the y-axis is written as $y = (x + c)^2$. The equation of a parabola with its turning point d units above the x-axis is written as $y = x^2 + d$. The vertex of the parabola formed by the equation $y = (x + 1)^2 + 2$ is found one unit to the left of the y-axis and two units above the x-axis, at the point $(-1,2)$. Alternatively, test each answer choice by plugging the x value of the choice into the equation and solving for y. Only the coordinates in choice **c**, $(-1, 2)$, represent a point on the parabola $(y = (x + 1)^2 + 2, 2 = (-1 + 1)^2 + 2, 2 = 0^2 + 2, 2 = 2)$, so it is the only point of the choices given that could be the vertex of the parabola.

9. a. When a base is raised to a fractional exponent, raise the base to the power given by the numerator and take the root given by the denominator. Raise the base, a, to the bth power, since b is the numerator of the exponent. Then, take the cth rooth of that: $\sqrt[c]{a^b}$.

10. e. No penguins live at the North Pole, so anything that lives at the North Pole must not be a penguin. If Flipper lives at the North Pole, then he, like all things at the North Pole, is not a penguin.

11. e. If $p < 0$ and $q > 0$, then $p < q$. Since $p < q$, p plus any value will be less than q plus that same value (whether positive or negative). Therefore, $p + r < r + q$.

12. d. 22% of the movies rented were action movies; $250(0.22) = 55$ movies; 12% of the movies rented were horror movies; $250(0.12) = 30$ movies. There were $55 - 30 = 25$ more action movies rented than horror movies.

13. b. The circumference of a circle is equal to $2\pi r$, where r is the radius of the circle. If the circumference of the circle $= 20\pi$ units, then the radius of the circle is equal to ten units. The base of triangle ABC is the diameter of the circle, which is twice the radius. The base of the triangle is 20 units and the height of the triangle is eight units. The area of a triangle is equal to $\frac{1}{2}bh$, where b is the base of the triangle and h is the height of the triangle. The area of triangle $ABC = \frac{1}{2}(8)(20) = \frac{1}{2}(160) = 80$ square units.

14. b. The area of a triangle is equal to $\frac{1}{2}bh$, where b is the base of the triangle and h is the height of the triangle. The base and height of an isosceles right triangle are equal in length. Therefore, $\frac{1}{2}b^2 = 18$, $b^2 = 36$, $b = 6$. The legs of the triangle are 6 cm. The hypotenuse of an isosceles right triangle is equal to the length of one leg multiplied by $\sqrt{2}$. The hypotenuse of this triangle is equal to $6\sqrt{2}$ cm.

15. a. If $a = 4$, x could be less than a. For example, x could be 3: $4 < \frac{43}{3(3)} < 8$, $4 < \frac{43}{9} < 8$, $4 < 4\frac{7}{9} < 8$. Although $x < a$ is not true for all values of x, it is true for some values of x.

16. c. The perimeter of a rectangle is equal to $2l + 2w$, where l is the length of the rectangle and w is the width of the rectangle. If the length is one greater than three times the width, then set the width equal to x and set the length equal to $3x + 1$:
$2(3x + 1) + 2(x) = 26$
$6x + 2 + 2x = 26$
$8x = 24$
$x = 3$
The width of the rectangle is 3 ft and the length of the rectangle is 10 ft. The area of a rectangle is equal to lw; $(10\text{ ft})(3\text{ ft}) = 30\text{ ft}^2$.

17. a. The measure of an exterior angle of a triangle is equal to the sum of the two interior angles of the triangle to which the exterior angle is NOT supplementary. Angle i is supplementary to angle g, so the sum of the interior angles e and f is equal to the measure of angle i: $i = e + f$.

18. e. An irrational number is a number that cannot be expressed as a repeating or terminating decimal. $(\sqrt{32})^3 = (\sqrt{32})(\sqrt{32})(\sqrt{32}) = 32\sqrt{32} = 32\sqrt{16}\sqrt{2} = (32)(4)\sqrt{2} = 128\sqrt{2}$. $\sqrt{2}$ cannot be expressed as a repeating or terminating decimal, therefore, $128\sqrt{2}$ is an irrational number.

19. b. The area of a square is equal to s^2, where s is the length of a side of the square. The area of $ABCD$ is $4^2 = 16$ square units. The area of a circle is equal to πr^2, where r is the radius of the circle. The diameter of the circle is four units. The radius of the circle is $\frac{4}{2}$ = two square units. The area of the circle is equal to $\pi(2)^2 = 4\pi$. The shaded area is equal to one-fourth of the difference between the area of the square and the area of the circle: $\frac{1}{4}(16 - 4\pi) = 4 - \pi$.

20. a. To increase d by 50%, multiply d by 1.5: $d = 1.5d$. To find 50% of $1.5d$, multiply $1.5d$ by 0.5: $(1.5d)(0.5) = 0.75d$. Compared to its original value, d is now 75% of what it was. The value of d is now 25% smaller.

Section 2 Answers

1. e. An expression is undefined when a denominator of the expression is equal to zero. When $x = -2$, $x^2 + 6x + 8 = (-2)^2 + 6(-2) + 8 = 4 - 12 + 8 = 0$.

2. e. Parallel lines have the same slope. The lines $y = 6x + 6$ and $y = 6x - 6$ both have a slope of 6, so they are parallel to each other.

3. c. Substitute 8 for a: $\frac{8}{b-4} = \frac{4b}{8} + 1$. Rewrite 1 as $\frac{8}{8}$ and add it to $\frac{4b}{8}$, then cross multiply:
$\frac{8}{b-4} = \frac{4b+8}{8}$
$4b^2 - 8b - 32 = 64$
$b^2 - 2b - 8 = 16$
$b^2 - 2b - 24 = 0$
$(b - 6)(b + 4) = 0$
$b - 6 = 0$, $b = 6$
$b + 4 = 0$, $b = -4$

4. e. If the average of five consecutive odd integers is -21, then the third integer must be -21. The two larger integers are -19 and -17 and the two lesser integers are -23 and -25. -25 is the least of the five integers. Remember, the more a number is negative, the less is its value.

5. c. A square has four right (90-degree) angles. The diagonals of a square bisect its angles. Diagonal AC bisects C, forming two 45-degree angles, angle ACB and angle ACD. The sine of 45 degrees is equal to $\frac{\sqrt{2}}{2}$.

6. c. The volume of a cylinder is equal to $\pi r^2 h$, where r is the radius of the cylinder and h is the height. The volume of a cylinder with a radius of 1 and a height of 1 is π. If the height is doubled and the radius is halved, then the volume becomes $\pi(\frac{1}{2})^2(2)(1) = \pi(\frac{1}{4})2 = \frac{1}{2}\pi$. The volume of the cylinder has become half as large.

7. d. $\frac{1}{a^{-1}} = \frac{1}{\frac{1}{a}} = a$, $\frac{\frac{b}{a}-a}{a} = (\frac{b}{a}-a)(\frac{1}{a}) = \frac{b}{a^2-1}$

8. d. The volume of a cube is equal to e^3, where e is the length of an edge of the cube. The surface area of a cube is equal to $6e^2$. If the ratio of the number of cubic units in the volume to the number of square units in the surface area is 2:3, then three times the volume is equal to two times the surface area:

$3e^3 = 2(6e^2)$

$3e^3 = 12e^2$

$3e = 12$

$e = 4$

The edge of the cube is four units and the surface area of the cube is $6(4)^2 = 96$ square units.

9. $\frac{5}{8}$ The set of whole number factors of 24 is {1, 2, 3, 4, 6, 8, 12, 24}. Of these numbers, four (4, 8, 12, 24) are multiples of four and three (6, 12, 24) are multiples of six. Be sure not to count 12 and 24 twice—there are five numbers out of the eight factors of 24 that are a multiple of either four or six. Therefore, the probability of selecting one of these numbers is $\frac{5}{8}$.

10. 510 If 32% of the students have left the auditorium, then $100 - 32 = 68\%$ of the students are still in the auditorium; 68% of 750 = $(0.68)(750) = 510$ students.

11. 15 Use the distance formula to find the distance from $(-1,2)$ to $(11,-7)$:

Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Distance $= \sqrt{(11 - (-1))^2 + ((-7) - 2)^2}$

Distance $= \sqrt{(12)^2 + (-9)^2}$

Distance $= \sqrt{144 + 81}$

Distance $= \sqrt{225}$

Distance $= 15$ units

12. 17.6 If Robert averages 16.3 feet for five jumps, then he jumps a total of $(16.3)(5) = 81.5$ feet. The sum of Robert's first four jumps is 12.4 ft + 18.9 ft + 17.3 ft + 15.3 ft = 63.9 ft. Therefore, the measure of his fifth jump is equal to 81.5 ft – 63.9 ft = 17.6 ft.

13. 35 The order of the four students chosen does not matter. This is a "seven-choose-four" combination problem—be sure to divide to avoid counting duplicates: $\frac{(7)(6)(5)(4)}{(4)(3)(2)(1)} = \frac{840}{24} = 35$. There are 35 different groups of four students that Mr. Randall could form.

14. 4,000 The Greenvale sales, represented by the light bars, for the months of January through May respectively were $22,000, $36,000, $16,000, $12,000, and $36,000, for a total of $122,000. The Smithtown sales, represented by the dark bars, for the months of January through May respectively were $26,000, $32,000, $16,000, $30,000, and $22,000, for a total of $126,000. The Smithtown branch grossed $126,000 – $122,000 = $4,000 more than the Greenvale branch.

15. 21 Both figures contain five angles. Each figure contains three right angles and an angle labeled 105 degrees. Therefore, the corresponding angles in each figure whose measures are not given (angles B and G, respectively) must also be equal, which makes the two figures similar. The lengths of the sides of similar figures are in the same ratio. The length of side FJ is 36 units and the length of its corresponding side, AE, in figure $ABCDE$ is 180 units. Therefore, the ratio of side FJ to side AE is 36:180 or 1:5. The lengths of sides FG and AB are in the same ratio. If the length of side FG is x, then: $\frac{x}{105} = \frac{1}{5}$, $5x = 105$, $x = 21$. The length of side FG is 21 units.

16. 4 DeDe runs 5 mph, or 5 miles in 60 minutes. Use a proportion to find how long it would take for DeDe to run 2 miles: $\frac{5}{60} = \frac{2}{x}$, $5x = 120$, $x = 24$ minutes. Greg runs 6 mph, or 6 miles in 60 minutes. Therefore, he runs 2 miles in

$\frac{6}{60} = \frac{2}{x}$, $6x = 120$, $x = 20$ minutes. It takes DeDe $24 - 20 = 4$ minutes longer to run the field.

17. **84** If point A is located at $(-3,12)$ and point C is located at $(9,5)$, that means that either point B or point D has the coordinates $(-3,5)$ and the other has the coordinates $(9,12)$. The difference between the different x values is $9 - (-3) = 12$ and the difference between the different y values is $12 - 5 = 7$. The length of the rectangle is 12 units and the width of the rectangle is seven units. The area of a rectangle is equal to its length multiplied by its width, so the area of $ABCD = (12)(7) = 84$ square units.

18. **135** The length of an arc is equal to the circumference of the circle multiplied by the measure of the angle that intercepts the arc divided by 360. The arc measures 15π units, the circumference of a circle is 2π multiplied by the radius, and the radius of the circle is 20 units. If x represents the measure of angle AOB, then:

$15\pi = \frac{x}{360}2\pi(20)$
$15 = \frac{x}{360}(40)$
$15 = \frac{x}{9}$
$x = 135$

The measure of angle AOB is 135 degrees.

Section 3 Answers

1. **d.** $\frac{2}{5} = 0.40$. $\frac{3}{7} \approx 0.43$. Comparing the hundredths digits, $3 > 0$, therefore, $0.43 > 0.40$ and $\frac{3}{7} > \frac{2}{5}$.

2. **b.** Solve $3x - y = 2$ for y: $-y = -3x + 2$, $y = 3x - 2$. Substitute $3x - 2$ for y in the second equation and solve for x:
$2(3x - 2) - 3x = 8$
$6x - 4 - 3x = 8$
$3x - 4 = 8$
$3x = 12$
$x = 4$

Substitute the value of x into the first equation to find the value of y:
$3(4) - y = 2$
$12 - y = 2$
$y = 10$
$\frac{x}{y} = \frac{4}{10} = \frac{2}{5}$.

3. **c.** The roots of an equation are the values for which the equation evaluates to zero. Factor $x^3 + 7x^2 - 8x$: $x^3 + 7x^2 - 8x = x(x^2 + 7x - 8) = x(x + 8)(x - 1)$. When $x = 0, -8,$ or 1, the equation $f(x) = x^3 + 7x^2 - 8x$ is equal to zero. The set of roots is $\{0, -8, 1\}$.

4. **b.** First, find the slope of the line. The slope of a line is equal to the change in y values divided by the change in x values of two points on the line. The y value increases by 2 $(5 - 3)$ and the x value decreases by 4 $(-2 - 2)$. Therefore, the slope of the line is equal to $-\frac{2}{4}$, or $-\frac{1}{2}$. The equation of the line is $y = -\frac{1}{2}x + b$, where b is the y-intercept. Use either of the two given points to solve for b:
$3 = -\frac{1}{2}(2) + b$
$3 = -1 + b$
$b = 4$
The equation of the line that passes through the points $(2,3)$ and $(-2,5)$ is $y = -\frac{1}{2}x + 4$.

5. **a.** The empty crate weighs 8.16 kg, or 8,160 g. If Jon can lift 11,000 g and one orange weighs 220 g, then the number of oranges that he can pack into the crate is equal to $\frac{11,000 - 8,160}{220} = \frac{2,840}{220} \approx 12.9$. Jon cannot pack a fraction of an orange. He can pack 12 whole oranges into the crate.

6. **d.** The volume of a prism is equal to lwh, where l is the length of the prism, w is the width of the prism, and h is the height of the prism:
$(2x)(6x)(5x) = 1,620$
$60x^3 = 1,620$
$x^3 = 27$
$x = 3$
The length of the prism is $2(3) = 6$ mm, the width of the prism is $6(3) = 18$ mm, and the height of the prism is $5(3) = 15$ mm.

7. a. At the start, there are $5 + 3 + 2 = 10$ pens in the box, 3 of which are black. Therefore, the probability of selecting a black pen is $\frac{3}{10}$. After the black pen is removed, there are nine pens remaining in the box, five of which are blue. The probability of selecting a blue pen second is $\frac{5}{9}$. To find the probability that both events will happen, multiply the probability of the first event by the probability of the second event: $(\frac{3}{10})(\frac{5}{9}) = \frac{15}{90} = \frac{1}{6}$.

8. b. Angle *CBD* and angle *PBZ* are alternating angles—their measures are equal. Angle *PBZ* = 70 degrees. Angle *PBZ* + angle *ZBK* form angle *PBK*. Line *PQ* is perpendicular to line *JK*; therefore, angle *PBK* is a right angle (90 degrees). Angle *ZBK* = angle *PBK* – angle *PBZ* = 90 – 70 = 20 degrees.

9. c. For the first four days of the week, Monica sells 12 pretzels, 12 pretzels, 14 pretzels, and 16 pretzels. The median value is the average of the second and third values: $\frac{12 + 14}{2} = \frac{26}{2} = 13$. If Monica sells 13 pretzels on Friday, the median will still be 13. She will have sold 12 pretzels, 12 pretzels, 13 pretzels, 14 pretzels, and 16 pretzels. The median stays the same.

10. a. The denominator of each term in the pattern is equal to 2 raised to the power given in the numerator. The numerator decreases by 1 from one term to the next. Since 10 is the numerator of the first term, 10 – 9, or 1, will be the numerator of the tenth term. $2^1 = 2$, so the tenth term will be $\frac{1}{2}$.

11. a. No matter whether *p* is positive or negative, or whether *p* is a fraction, whole number, or mixed number, the absolute value of three times any number will always be positive and greater than the absolute value of that number.

12. d. Line *OB* ≅ line *OC*, which means the angles opposite line *OB* and *OC* (angles *C* and *B*) are congruent. Since angle *B* = 55 degrees, then angle *C* = 55 degrees. There are 180 degrees in a triangle, so the measure of angle *O* is equal to

$180 – (55 + 55) = 180 – 110 = 70$ degrees. Angle *O* is a central angle. The measure of its intercepted arc, minor arc *BC*, is equal to the measure of angle *O*, 70 degrees.

13. c. This uses the same principles as #10 in Test 1, section 2. ^ is a function definition just as # was a function definition. ^ means "take the value after the ^ symbol, multiply it by 2, and divide it by the value before the ^ symbol." So, *h*^*g* is equal to two times the value after the ^ symbol (two times *g*) divided by the number before the ^ symbol: $\frac{2g}{h}$. Now, take that value, the value of *h*^*g*, and substitute it for *h*^*g* in $(h\text{^}g)\text{^}h$: $(\frac{2g}{h})\text{^}h$. Now, repeat the process. Two times the value after the ^ symbol (two times *h*) divided by the number before the symbol: $\frac{2h}{\frac{2g}{h}} = \frac{2h^2}{2g} = \frac{h^2}{g}$.

14. c. If four copy machines make 240 copies in three minutes, then five copy machines will make 240 copies in *x* minutes:
$(4)(240)(3) = (5)(240)(x)$
$2,880 = 1,200x$
$x = 2.4$
Five copy machines will make 240 copies in 2.4 minutes. Since there are 60 seconds in a minute, 0.4 of a minute is equal to $(0.4)(60) = 24$ seconds. The copies will be made in 2 minutes, 24 seconds.

15. d. 40% of $j = 0.4j$, 50% of $k = 0.5k$. If $0.4j = 0.5k$, then $j = \frac{0.5k}{0.4} = 1.25k$. *j* is equal to 125% of *k*, which means that *j* is 25% larger than *k*.

16. e. *FDCB* is a rectangle, which means that angle *D* is a right angle. Angle *ECD* is 60 degrees, which makes triangle *EDC* a 30-60-90 right triangle. The leg opposite the 60-degree angle is equal to $\sqrt{3}$ times the length of the leg opposite the 30-degree angle. Therefore, the length of side *DC* is equal to $\frac{6}{\sqrt{3}}$, or $2\sqrt{3}$. The hypotenuse of a 30-60-90 right triangle is equal to twice the length of the leg opposite the 30-degree angle, so the length of *EC* is $2(2\sqrt{3}) = 4\sqrt{3}$. Angle *DCB* is also a right angle, and triangle *ABC* is also a

30-60-60 right triangle. Since angle *ECD* is 60 degrees, angle *ECB* is equal to 90 − 60 = 30 degrees. Therefore, the length of *AC*, the hypotenuse of triangle *ABC*, is twice the length of *AB*: 2(10) = 20. The length of *AC* is 20 and the length of *EC* is $4\sqrt{3}$. Therefore, the length of *AE* is $20 - 4\sqrt{3}$.