▶ Part 4: Mathematics Knowledge

Time: 24 minutes

1. $-\frac{5}{3}-\frac{1}{3}=$

a. $\frac{4}{3}$

b. $-\frac{4}{3}$

c. 2

d. –2

Answers

Part 4: Mathematics Knowledge

1. d. Subtract to get $-\frac{6}{3}$, which reduces to –2.

2. The volume of an object is measured in
- **a.** inches.
- **b.** square units.
- **c.** cubic units.
- **d.** quadrants.

3. When calculating the area of a figure, you are finding
- **a.** the distance around the object.
- **b.** the length of a side.
- **c.** the amount of space that the object covers.
- **d.** the number of sides it has.

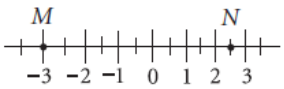
4. $12(84 - 5) - (3 \times 54) =$
- **a.** 54,000
- **b.** 841
- **c.** 796
- **d.** 786

5. Which of the following numbers is the smallest?
- **a.** $\frac{6}{10}$
- **b.** $\frac{8}{15}$
- **c.** $\frac{33}{60}$
- **d.** $\frac{11}{20}$

6. Which of the following is equivalent to $42{,}549.23 \times 10^{-2}$?
- **a.** 425.4923×10
- **b.** $4{,}254{,}923 \times 10$
- **c.** 4.254923×10^4
- **d.** 4.254923×10^2

7. When measuring the area of a football field, you would most likely use
- **a.** square inches.
- **b.** square millimeters.
- **c.** square miles.
- **d.** square yards.

8. On the number line below, point L is to be located halfway between points M and N. What number will correspond to point L?



- **a.** $-\frac{1}{4}$
- **b.** $-\frac{1}{2}$
- **c.** $-1\frac{1}{4}$
- **d.** 0

9. Which of the following statements is true?
- **a.** Parallel lines intersect at right angles.
- **b.** Parallel lines never intersect.
- **c.** Perpendicular lines never intersect.
- **d.** Intersecting lines have two points in common.

10. A practice diving tank is 16 feet long, 12 feet wide, and 14 feet deep. It is currently filled up to the 3-foot mark, and must get filled to the 12-foot line in order for a class to practice their first dive. How many cubic feet of water must be added to the pool in order to fill it so that the water is 12 feet deep?
- **a.** 192 cubic feet
- **b.** 1,728 cubic feet
- **c.** 2,304 cubic feet
- **d.** 2,688 cubic feet

11. What is the next number in the following series?

3 16 6 12 12 8 _____
- **a.** 4
- **b.** 15
- **c.** 20
- **d.** 24

12. Which number sentence is true?
- **a.** $4.3 < 0.43$
- **b.** $0.43 < 0.043$
- **c.** $0.043 > 0.0043$
- **d.** $0.0043 > 0.043$

Answers

2. c. Since volume contains three dimensions—length, width, and height—it's measured in cubic units.

3. c. The area of a figure is the amount of space the object covers, in square units.

4. d. Perform the operations in the parentheses first: $(12)(79) - 162 = 786$.

5. b. Fractions must be converted to the lowest common denominator, which allows you to compare the amounts: $\frac{36}{60}$, $\frac{32}{60}$, $\frac{33}{60}$, and $\frac{33}{60}$.

6. d. $42{,}549.23 \times 10^{-2} = 425.4923$ (move the decimal twice to the left because of the –2 power). Then, 425.4923 can be written as 4.254923×10^2.

7. d. A football field would most likely be measured in square yards. Square inches and square millimeters are too small, and square miles are too large.

8. a. The halfway point on the number line is between 0 and $-\frac{1}{2}$, which is $-\frac{1}{4}$.

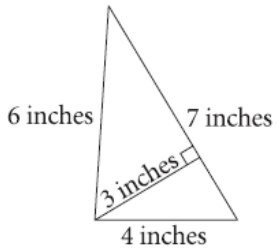
9. b. Corresponding points on parallel lines are always the same distance apart, so the lines can never intersect.

10. b. The volume needed to fill the pool 9 more feet deep (it's already filled to 3 feet) is $16 \times 12 \times 9 = 1{,}728$ cubic feet.

11. d. This series actually has two alternating sets of numbers. The first number is doubled, giving the third number. The second number has 4 subtracted from it, giving the fourth number. Therefore, the blank space will be 12 doubled, or 24.

12. c. The farther to the right the digits go, the smaller the number.

13. What is the area of the triangle?



a. 24 inches^2
b. 12 inches^2
c. 21 inches^2
d. 10.5 inches^2

14. If $\frac{x}{2} + \frac{x}{6} = 4$, what is x?

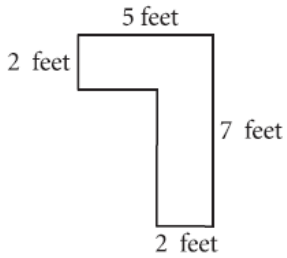
a. $\frac{1}{24}$
b. $\frac{1}{6}$
c. 3
d. 6

15. Choose the answer to the following problem:
$10^5 \div 10^2 =$
a. 10
b. 10^3
c. 10^7
d. 10^{10}

16. $3.16 \div 0.079 =$
a. 0.025
b. 2.5
c. 4.0
d. 40

17. $\frac{21}{8}$ is equal to
a. 21.8
b. 2.58
c. 2.6
d. 2.625
d. square yards.

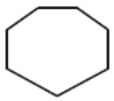
18. What is the area of the following figure?



a. 19 square feet
b. 20 square feet
c. 24 square feet
d. 38 square feet

19. What is $7\frac{1}{5}\%$ of 465, rounded to the nearest tenth?
a. 32.5
b. 33
c. 33.5
d. 34

20. What kind of polygon is the following figure?



a. heptagon
b. octagon
c. hexagon
d. pentagon

21. Which of the following is equivalent to $3k^2 + 4k$?
a. $7k^2$
b. $7k^3$
c. $3 \times k \times k + k \times k \times k \times k$
d. $3 \times k \times k + k + k + k + k$

Answers

13. **d.** Area $= \frac{1}{2}(\text{base} \times \text{height}) = \frac{1}{2}(7 \times 3) = 10.5$ (the height must always be at a 90° angle to the base).

14. **d.** To add the left side of the equation, find the common denominator, so that $\frac{3x}{6} + \frac{x}{6} = 4$; $\frac{4x}{6} = 4$; and $4x = 24$.

15. **b.** In a division problem like this, leave the whole number the same and subtract the exponents.

16. **d.** Create a division problem without decimals by moving the decimal point three places to the right: 3,160 divided by 79 is 40.

17. **d.** Perform long division out to the thousandths place to get 2.625.

18. **b.** Find the area of two rectangles and then add the results. Use an imaginary line to block off the first rectangle at the top of the figure. This rectangle measures (5 feet)(2 feet) = 10 square feet. The second rectangle is also (5 feet)(2 feet). Add the two together for a total of 20 square feet.

19. **c.** First, change the percent to a decimal: $(.072) \times (465) = 33.48$, which rounded to the nearest tenth is 33.5.

20. **a.** A heptagon has seven sides.

21. **d.** $3k^2 = 3 \times k \times k$ and $4k = k + k + k + k$

22. For which of the following values of x is this number sentence true: $25 - x < 10$?

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

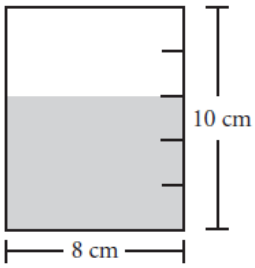
23. If \$4.60 is decreased by 15%, what is the resulting number?

a. \$3.91
b. \$0.69
c. \$4.45
d. \$3.06

24. What is the decimal form of $\frac{5}{6}$? (Round two decimal places.)

a. 0.65
b. 0.88
c. 0.83
d. 0.13

25. What is the volume of liquid remaining in this cylinder?



a. 64π cm^3
b. 80π cm^3
c. 96π cm^3
d. 160π cm^3

Answers

22. **a.** $25 - 16 = 9$, which is the only choice that leaves you with a number less than 10.

23. **a.** Find 15% of \$4.60: $0.15 \times 4.60 = 0.69$. Next, subtract 0.69 from 4.60 to get the decreased price.

24. **c.** Divide 5 by 6 to convert the fraction into a decimal; $5 \div 6 = 0.8\overline{33}$. Round two decimal places to get 0.83.

25. **c.** The volume of a cylinder equals $\pi r^2 h$, where r is the radius of the cylinder and h is the height. The radius is half the diameter, so the radius of this cylinder is 4 cm. The height of the volume is $10 - 4 = 6$ (the height of the whole cylinder minus the height of space in which the liquid has been poured out). So the volume is $\pi(4)^2(6)$, or $\pi(16)(6) = 96\pi$ cm^3.