

## Algebra EOC Item Specs Practice Test

- 1 As a diver swims deeper underwater, the water pressure in pounds per square inch (PSI) increases on the diver. The table below shows the pressure in PSI for several depths of water.

WATER PRESSURE

| Depth (in feet) | Pressure (in PSI) |
|-----------------|-------------------|
| 10              | 4.3               |
| 20              | 8.6               |
| 30              | 12.9              |
| 40              | 17.2              |
| 50              | 21.5              |

Which equation represents  $p$ , the water pressure in square inches, as a function of  $d$ , the depth in feet?

- Ⓐ  $p = 4.3d$                       Ⓒ  $p = 23.3d$   
 Ⓑ  $p = 0.43d$                       Ⓓ  $p = 2.33d$

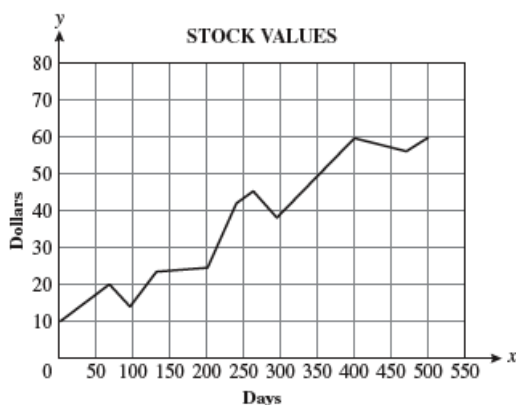
- 2 For one child, a childcare facility charges \$300 per month for preschool and \$3.50 per hour for each hour of childcare after preschool. The function below can be used to determine  $f(h)$ , the monthly fee for childcare and preschool, where  $h$  represents the number of hours spent in childcare after preschool.

$$f(h) = 300 + 3.5h$$

If the one-month charges for one child totaled \$637.75, what was the total number of hours the child spent in childcare after preschool?

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- 3 An economics teacher plotted the value of a stock on 11 different days during a 500-day period and used line segments to connect them. In the graph below, the horizontal axis is measured in days and the vertical axis is measured in dollars.



Based on the graph, which of the following best describes the range of the value of the stock for this 500-day period?

- (A)  $0 \leq x \leq 500$                       (C)  $10 \leq y \leq 60$   
 (B)  $1 \leq x \leq 500$                       (D)  $0 \leq y \leq 80$

- 4 The set of ordered pairs shown below defines a relation.

$$\{(0, 0), (1, 5), (2, 8), (3, 9), (4, 8), (5, 5), (6, 0)\}$$

What is the value of the greatest element in the range of this relation?

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- 5 Mario needs to cut three book shelves from a board that is 1.8 meters long. The second shelf is 15 centimeters longer than twice the length of the first shelf. The remaining shelf is 5 centimeters longer than the first shelf. The equation below represents this situation, where  $x$  is the length of the first shelf in meters.

$$x + (2x + 0.15) + (x + 0.05) = 1.8$$

Which of the following is the length, in meters, of the first shelf?

- (A) 0.40                      (B) 0.45                      (C) 0.53                      (D) 0.96

- 6 Bill is planning to drive from his house to a baseball stadium and arrive in time for the beginning of the championship game. His arrival time depends on the traffic. If traffic is light, he will travel at an average speed of 50 miles per hour and arrive 1 hour early. If traffic is heavy, he will travel at an average speed of 30 miles per hour and arrive on time. The equation below can be used to model this situation, where  $t$  represents Bill's driving time, in hours.

$$50(t - 1) = 30t$$

What is the distance, **in miles**, from Bill's house to the baseball stadium?

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- 7 The Gross Domestic Product of a country for a given year is the sum of the market values of all goods and services produced within the country during that year. The Gross Domestic Product per capita is found by using the following formula.

$$S = \frac{C + I + G + N}{P}$$

where:

$S$  = Gross Domestic Product per capita

$C$  = consumer spending

$I$  = investment

$G$  = government purchases

$N$  = net exports

$P$  = population

Which of the following shows the Gross Domestic Product per capita formula solved for  $C$ ?

Ⓐ  $C = \frac{PS}{I - G - N}$

Ⓒ  $C = PS - I - G - N$

Ⓑ  $C = \frac{PS}{I + G + N}$

Ⓓ  $C = PS - I + G + N$

- 8 Taylor has a total of \$25 to spend on dinner, which includes a 6.5% sales tax and a 20% tip. Taylor used the inequality shown below to calculate the amount in dollars,  $a$ , she can spend before tax and tip.

$$1.2(a + 0.065a) \leq 25$$

Which of the following shows the solution to this inequality?

Ⓐ  $a \leq 22.74$

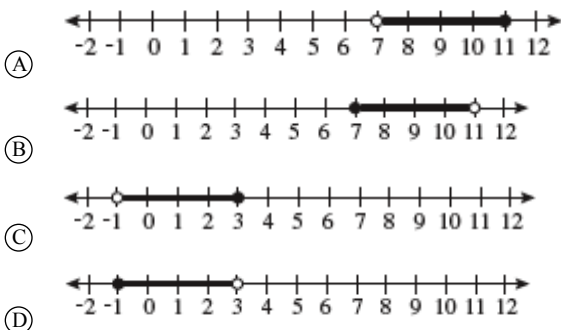
Ⓒ  $a \leq 19.76$

Ⓑ  $a \leq 22.34$

Ⓓ  $a \leq 19.56$

- 9 Which graph shows the solution to the inequality shown below?

$$15 \leq 7n - 2(n - 10) < 35$$



- 10 The out-of-pocket costs to an employee for health insurance and medical expenses for one year are shown in the table below.

**EMPLOYEE'S ANNUAL HEALTH CARE COSTS**

| Type of Cost | Definition  | Cost to Employee |
|--------------|---|------------------|
| Premium      | Total amount employee pays insurance company for the policy                         | \$3,626          |
| Deductible   | Amount of medical expenses employee pays before insurance company pays for anything | \$500            |
| Co-payment   | Percentage of medical expenses after the first \$500 that employee has to pay       | 20%              |

According to the plan outlined in the table, total annual health care costs,  $C$ , depend on the employee's medical expenses for that year. If  $x$  represents the total medical expenses of an employee on this plan and  $x \geq 500$ , which of the following equations can be used to determine this employee's total health care costs for that year?

- (A)  $C = 3,626 - 500 + 0.20(x - 500)$       (C)  $C = 3,626 + 500 + 0.20(x - 500)$   
 (B)  $C = 3,626 - 500 + 0.20x$       (D)  $C = 3,626 + 500 + 0.20x$

- 11 Karen works as a salesperson for a local marketing company. Using the equations shown below, the company calculates her monthly earnings based upon her total sales for the month.

MONTHLY EARNINGS EQUATIONS

| Total Sales for the Month<br>( $s$ in dollars) | Earnings Equation                   |
|--|-------------------------------------|
| $s \leq \$5,000$                               | $E = 1,600 + 0.1s$                  |
| $s > \$5,000$                                  | $E = 1,600 + 0.1s + 0.15(s - 5000)$ |

where:

$E$  represents total monthly earnings before taxes and withholding

$s$  represents the dollar amount of her total sales

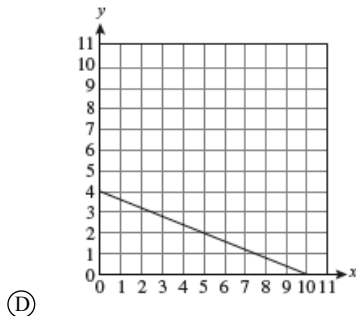
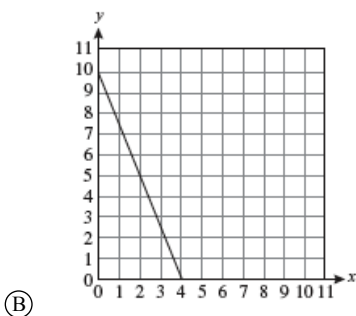
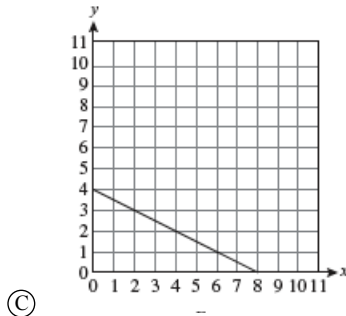
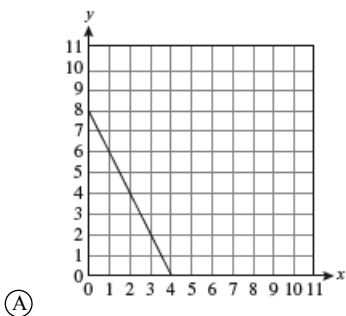
Karen's total sales were greater than \$5,000 in October. If her total monthly earnings for October were \$3,000, what was the value of her total monthly sales,  $s$  ?

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- 12 Roger went to a garage sale where hardback books sold for \$5 each and paperback books sold for \$2.50 each. He has \$20 to spend. The equation below can be used to find how many books of each type Roger can buy, where  $x$  is the number of hardback books and  $y$  is the number of paperback books.

$$5x + 2.5y = 20$$

Which of the following shows the graph of this equation?

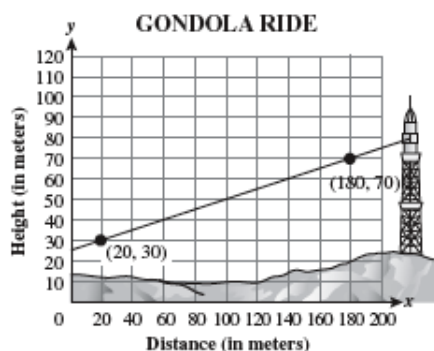


- 13 An architect designed an outdoor staircase for a house. The relationship between the height of the steps and the length of the tread is modeled by the equation  $57x - 95y = 0$ .

Which of the following represents the slope of the equation?

- (A)  $\frac{5}{3}$                       (B)  $\frac{3}{2}$                       (C)  $\frac{2}{3}$                       (D)  $\frac{3}{5}$

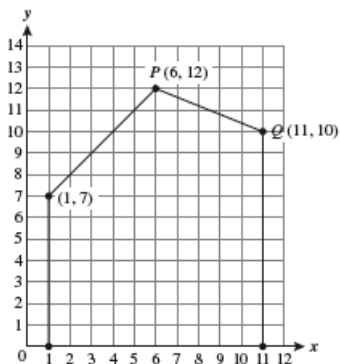
- 14 An engineer needs to determine the slope between two points on a gondola ride in order to evaluate the power requirements when the gondola is full of passengers. A coordinate grid has been placed over a diagram between the two points, as shown below. For estimation purposes, a straight line between the two points can be used to find the slope.



Assuming the cable runs in a straight line, what is the slope of the line between the two points shown?

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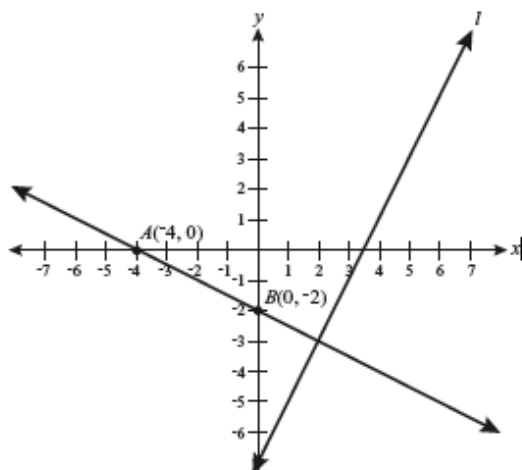
- 15 In a technical drawing class, students are analyzing the side view of a house that has been positioned on a coordinate grid, as shown below.



Which of the following equations best represents the line that contains  $\overline{PQ}$ ?

- (A)  $y = -\frac{5}{2}x + 14.4$                       (C)  $y = -\frac{2}{5}x + 14.4$   
 (B)  $y = \frac{5}{2}x + 27$                       (D)  $y = \frac{2}{5}x + 27$

On the coordinate grid below, line  $l$  is perpendicular to  $\overleftrightarrow{AB}$ .



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What is the slope of line  $l$ ?

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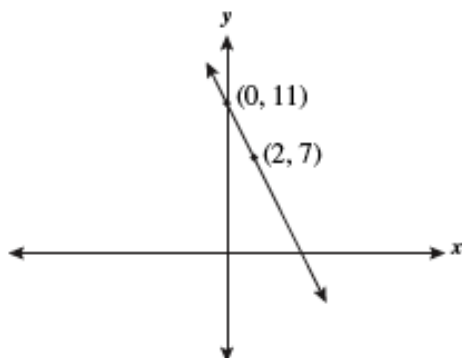
David is training for a marathon. He writes down the time and distance for each training run and then records the data on a scatter plot. He has drawn a line of best fit on the scatter plot, as shown below.



Which statement best expresses the meaning of the slope as a rate of change for this line of best fit?

- (A) It represents the number of miles he will have to run to finish the marathon.      (C) It represents the number of hours he will need to finish the marathon.  
 (B) It represents the average speed, in miles per hour, of his training runs.      (D) It represents the distances, in miles, that he ran while he was training.

- 18 Joel graphed the line shown on the coordinate plane below.



What is the  $x$ -coordinate of the point at which this line intersects the  $x$ -axis?

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- 19 Russ bought 3 medium and 2 large submarine sandwiches for a total of \$29.95. Stacy bought 4 medium and 1 large submarine sandwiches for a total of \$28.45.

Which statement shows the cost of each medium and each large submarine sandwich?

- |   |   |
|---|---|
| <p>(A) Each medium sandwich costs \$5.69 and each large sandwich costs \$6.89.</p> <p>(B) Each medium sandwich costs \$5.69 and each large sandwich costs \$6.39.</p> | <p>(C) Each medium sandwich costs \$5.39 and each large sandwich costs \$6.89.</p> <p>(D) Each medium sandwich costs \$5.39 and each large sandwich costs \$6.39.</p> |
|---|---|

- 20 A website that sells songs for downloading increased its price per song from \$0.99 to \$1.29. Macy spent \$15.36 downloading songs during the month of the price increase. She downloaded 4 more songs at \$0.99 than at \$1.29. The set of equations below represents the situation where  $x$  is the number of songs Macy downloaded at \$0.99 and  $y$  is the number of songs she downloaded at \$1.29.

$$\begin{aligned} x &= y + 4 \\ 0.99x + 1.29y &= 15.36 \end{aligned}$$

What is the exact number of songs Macy downloaded at the \$0.99 price?

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21 The expression  $(m^6 n^5 q^3)^2$  is equivalent to which of the following?

Ⓐ  $m^{12} n^{10} q^6$

Ⓒ  $2m^8 n^7 q^5$

Ⓑ  $m^{36} n^{25} q^9$

Ⓓ  $2m^{12} n^{10} q^6$

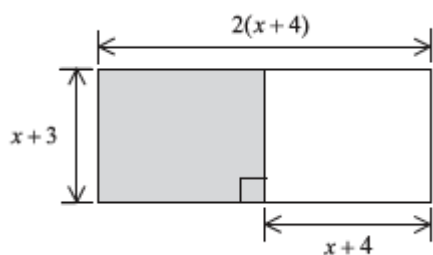
22 Mina simplified the expression shown below.

$$(a^3 b^{-6})(a^2 b^2)$$

Her final answer was in the form  $a^m b^n$ . If she simplified the expression correctly, what is the value of  $n$ , the exponent on  $b$ ?

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23 Which expression is equivalent to the perimeter of the shaded portion of the rectangle?



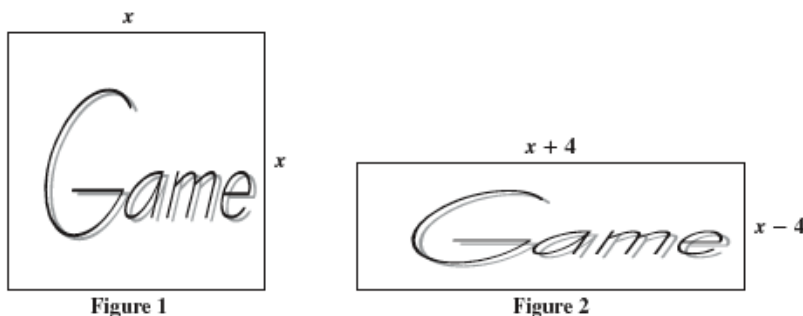
Ⓐ  $2x + 10$

Ⓒ  $4x + 14$

Ⓑ  $2x + 12$

Ⓓ  $8x + 28$

- 24 New photo imaging techniques on computers allow artists to distort an image from its original shape. Figure 1 is a square image. Figure 2 is stretched 4 units wider and shrunk 4 units shorter than Figure 1.



How many square units greater is the area of Figure 1 than the area of Figure 2?

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- 25 Members of the art club want to raise money for their next field trip. They plan to decorate greeting cards with glitter and origami animals made of origami paper. They wrote the expression below to help calculate their total expenses.

$$(np + ng) + nc$$

where:

$c$  cost of one greeting card

$g$  cost of glitter per card

$p$  cost of origami animals per card

$n$  number of cards

Which of the following expressions is equivalent to the expression above?

(A)  $n(p + g + c)$

(C)  $3n(p + g) + c$

(B)  $n(p + g) + c$

(D)  $3n(p + g + c)$

- 26 If  $x \neq 3$ , which of the following shows the expression below in simplest form?

$$\frac{3x^2 - 27}{x - 3}$$

(A)  $3(x + 3)$

(C)  $3(x + 9)$

(B)  $3(x - 3)$

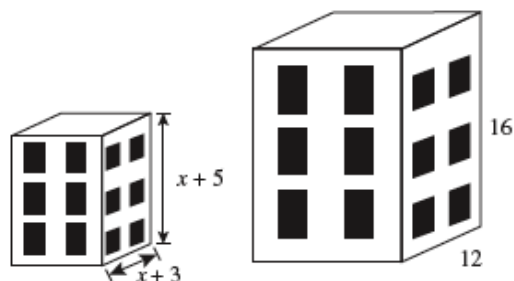
(D)  $3(x - 9)$

- 27 Charlie needs to simplify the expression below before he substitutes values for  $x$  and  $y$ .

$$\frac{x^{18}y^{12} + x^9y^8}{x^3y^4}$$

If  $x \neq 0$  and  $y \neq 0$ , which of the following is a simplified version of the expression above?

- (A)  $x^9y^5$                       (C)  $x^6y^3 + x^3y^2$   
 (B)  $x^{24}y^{16}$                     (D)  $x^{15}y^8 + x^6y^4$
- 28 Tammy made similar models of a building, with dimensions, in inches, as shown in the diagram below.



What is the value, in inches, of  $x$ ?

- (A) 3                      (B) 4                      (C) 5                      (D) 6
- 29 What is the solution of the equation below?

$$\frac{2}{x - 14} = \frac{3}{4x}$$

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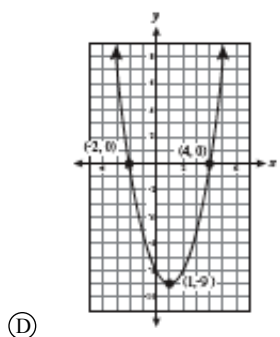
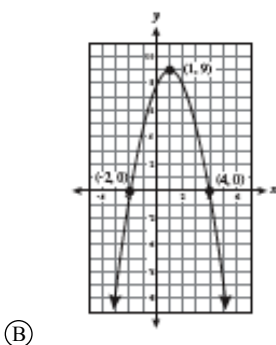
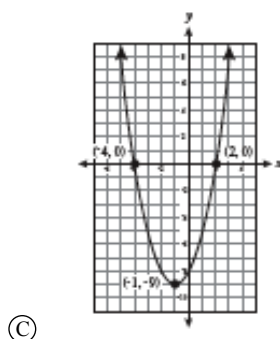
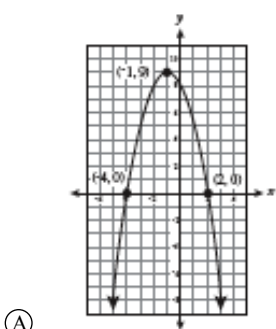
- 30 Neelam simplified the expression below for a homework assignment.

$$\sqrt{12} + \sqrt{3x} + 7\sqrt{3}$$

If Neelam simplified the expression correctly, which of the following is her answer?

- (A)  $9\sqrt{3} + \sqrt{3x}$  (C)  $7\sqrt{15} + \sqrt{3x}$   
 (B)  $11\sqrt{3} + \sqrt{3x}$  (D)  $8\sqrt{15} + \sqrt{3x}$

- 31 Which of the following is the graph of  $y = x^2 + 2x - 8$ ?



- 32 Jeannie solved the quadratic equation shown below by factoring.

$$x^2 + 2x - 8 = 0$$

Which of the following shows a step in solving the equation shown?

- (A)  $(x + 2)(x + 4) = 0$  (C)  $(x - 2)(x + 4) = 0$   
 (B)  $(x + 2)(x - 4) = 0$  (D)  $(x - 2)(x - 4) = 0$

- 33 A ball is kicked from ground level into the air. Its height  $y$ , in feet, after  $x$  seconds can be represented by the equation  $y = 40x - 16x^2$ . What is the total elapsed time, in seconds, from the time the ball is kicked until it reaches ground level again?

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- 34 The set  $T$  represents several Taurine breeds of cattle.

$$T = \{\text{Angus, Devon, Shorthorn, Texas Longhorn}\}$$

The set  $Z$  represents several Zebu breeds of cattle.

$$Z = \{\text{Boran, Nelore, Ponwar}\}$$

What is the total number of elements in the set  $T \times Z$ ?

- Ⓐ 7                      Ⓑ 9                      Ⓒ 12                      Ⓓ 20

- 35 Set  $D$  lists the ages of Dianna's grandchildren.

$$D = \{2, 5, 6, 8, 10, 11\}$$

Set  $K$  lists the ages of Karen's grandchildren.

$$K = \{2, 10, 18\}$$

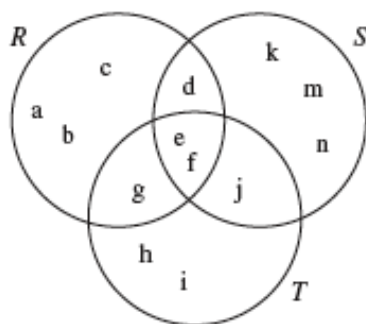
Set  $P$  lists the ages of Patrick's grandchildren.

$$P = \{10, 11, 14\}$$

What is the greatest age in the set  $(K \cup P) \cap D$ ?

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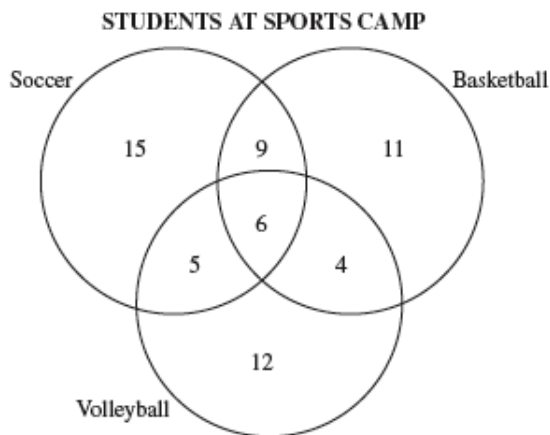
- 36** The universal set contains only sets  $R$ ,  $S$ , and  $T$ . These sets are related as shown in the Venn diagram below.



Which set represents  $(\sim R \cap S) \cup (\sim T \cap S)$ ?

- (A) {d, e, f, j}                      (C) {d, e, f, j, k, m, n}
- (B) {d, j, k, m, n}                  (D) {d, e, f, g, j, k, m, n}

- 37** The Venn diagram below shows the number of students who chose to participate in each of the three sports offered at Sports Camp.



Based on the diagram, what is the total number of students who did NOT participate in volleyball?

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