

# 8<sup>th</sup> Grade MEAP Released Items - Mathematics

## Based on 7<sup>th</sup> Grade GLCEs:

The main focus in grade seven is the algebra concept of linear relationships, including ideas about proportional relationships. Students should understand the relationship of equations to their graphs, as well as to tables and contextual situation for linear functions. In addition, work in algebra extends into simplifying and solving simple expressions and equations. The main concept from geometry in grade seven is similarity of polygons, which also draws on ideas about proportion. Students apply their understanding of ratio in data-based situations.

## NOTES

Items are arranged to match the way the items are ordered in the *Item Analysis Report* (which coincides with the way the GLCEs are arranged in the *State-Assessed Mathematics GLCEs* document.).

The following GLCE designations are provided:

Core: Content that is most commonly taught at grade level. **[Core]**

Core,  
Non-Calculator Item: Items where calculators are not allowed. **[Core-NC]**

Extended Core: Content commonly taught at grade level but narrower in scope and/or supportive to the core. **[Ext]**

Future Core: Content expectations previously taught at a higher grade level; will become core content in 2009-10. **[Fut]**

Not Assessed at the  
State Level [NASL]: GLCEs that are part of the State Curriculum, but not assessed on the MEAP. **[NASL]**

## **Number and Operations**

### **Understand derived quantities:**

**N.ME.07.01** Understand derived quantities such as density, velocity, and weighted averages. [Fut]

**(No questions associated with this future core GLCE.)**

**N.FL.07.02** Solve problems involving derived quantities. [Fut]

**(No questions associated with this future core GLCE.)**

**Understand and solve problems involving rates, ratios, and proportions:**

**N.FL.07.03** Calculate rates of change, including speed. **[Core]**

- 7 Jefferson Middle School opened in 1998 with 42 eighth grade students. The table below shows the increase in the number of eighth graders.

**Eighth Grade Enrollment**

Year	Number of Students
1998	42
1999	59
2000	76
2001	93

What is the rate of increase in the number of eighth graders at Jefferson Middle School?

- A 17 students/year
- B 23 students/year
- C 42 students/year
- D 51 students/year

Answer: A

- 23 A swimming pool is being filled with water at a rate of 1 inch/minute. The owners started filling the pool at 6:00 a.m. What time was it when the water was 6 feet deep?

- A 6:06 a.m.
- B 7:06 a.m.
- C 7:00 a.m.
- D 7:12 a.m.

Answer: D

- 30 Eric swam 200 meters in 2 minutes 5 seconds. What was his speed in meters per second?

- A 0.9 m/sec
- B 1.6 m/sec
- C 20 m/sec
- D 40 m/sec

Answer: B

**N.MR.07.04** Convert ratio quantities between different systems of units, such as feet per second to miles per hour. **[Core]**

**25** Max ran 1.5 miles in 12 minutes. What was his average speed in miles per hour (mph)?

- A** 7.5 mph
- B** 10.5 mph
- C** 12 mph
- D** 21 mph

Answer: A

**41** Michael is mixing concrete. The directions say to add 1 quart of water per pound of concrete mix. The concrete mix comes in 30-pound bags. What is the ratio of gallons of water per bag of concrete mix?

- A** 3.8 gallons/bag
- B** 7.5 gallons/bag
- C** 30 gallons/bag
- D** 120 gallons/bag

Answer: B

**48** Four friends ride their bicycles at the speeds shown below.

Jacob	9 feet per second
Kendra	170 yards per minute
Larry	500 feet per minute
Selena	5 miles per hour

Who is riding his or her bicycle the fastest?

- A** Jacob
- B** Kendra
- C** Larry
- D** Selena

Answer: A

**N.FL.07.05** Solve simple proportion problems using such methods as unit rate, scaling, finding equivalent fractions, and solving the proportion equation  $a/b = c/d$ ; know how to see patterns about proportional situations in tables. **[Core]**

- 4 Jennifer swims 10 laps. Each lap is 50 meters. How many meters does Jennifer swim?
- A 50 m
  - B 100 m
  - C 250 m
  - D 500 m

Answer: D

- 6 Five high school students go to a baseball game. The tickets normally cost \$8 each, but students can buy tickets for half price. How much did they pay for the five tickets?
- A \$20
  - B \$25
  - C \$32
  - D \$40

Answer: A

- 14 The height of a horse is often measured in *hands*. A *hand* is the approximate length of the palm of a man's hand, or 4 inches. If a horse is 18 *hands* tall, how tall is the horse?
- A 4 feet
  - B 6 feet
  - C 8 feet
  - D 18 feet

Answer: B

**Recognize irrational numbers:**

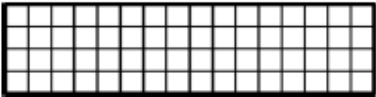
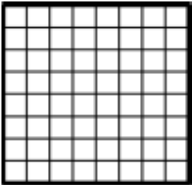

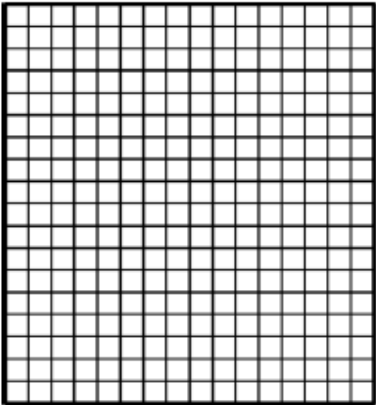
**N.MR.07.06** Understand the concept of square root and cube root, and estimate using calculators. **[Core]**

11 Which is the *best* approximation of  $\sqrt{17}$  ?

- A 4.1
- B 4.5
- C 4.8
- D 4.9

Answer: A

17 Which of the choices below *best* illustrates  $8^2$  ?

- A 
- B 
- C 
- D 

Answer: B

42 Which is the *best* approximation of the cube root of 31?

- A 3.1
- B 3.5
- C 5.5
- D 10

Answer: A

**Compute with rational numbers:**

**N.FL.07.07** Solve problems involving operations with integers. **[Core]**

- 3 Alicia owes Kiara \$4. She gets \$10 from her father, pays Kiara back, and buys a ticket for the school talent show for \$3. How much money does Alicia have now?

- A \$ 3
- B \$ 7
- C \$11
- D \$17

Answer: A

- 18 Which is equivalent to  $-4$  times  $-7$ ?

- A  $4 \times 7$
- B  $-4 \times 7$
- C  $\frac{4}{7}$
- D  $-4 \times \frac{1}{7}$

Answer: A

- 24 In a football game, a team lost 13 yards on one play, gained 7 on the next, and lost 3 on the third. What is their position (gain or loss) from their original location?

- A loss of 3 yards
- B loss of 9 yards
- C gain of 3 yards
- D gain of 17 yards

Answer: B

**N.FL.07.08** Add, subtract, multiply and divide negative rational numbers. **[Core]**

**16** Linda is on the fourth floor of a building. Her car is in the parking garage three levels below the ground floor. She gets in the elevator and travels from the fourth floor above ground level to the third floor below ground level. How many floors did she travel?

- A** -3
- B** 1
- C** 4
- D** 7

Answer: D

**20** Matt is playing a video game that uses numbers to move the characters. Negative numbers move the characters to the left and positive numbers move the characters to the right. His character is at the starting point. Which of the following combinations of numbers will move his character around and then back to the starting point?

- A**  $(20) + (-10) + (5) + (-13) + (-7)$
- B**  $(-7) + (12) + (-6) + (2) + (2)$
- C**  $(-2) + (13) + (6) + (-9) + (-8)$
- D**  $(18) + (-22) + (4) + (-4) + (-1)$

Answer: C

**37** What is the value of  $\frac{32}{-8} - 4$ ?

- A** -16
- B** -8
- C** 0
- D** 16

Answer: B

**N.FL.07.09** Estimate results of computations with rational numbers. **[Core]**

- 8** Erika bought 24 folders and 24 bottles of glue at the office supply store. The folders cost \$1.09 each and the bottles of glue cost \$1.29 each. Which amount is *closest* to the amount Erika spent?
- A** \$ 48
  - B** \$ 60
  - C** \$ 72
  - D** \$120

Answer: B

- 35** Peter bought a suit on sale. The original price of the suit was \$149.50. The price of the suit was reduced by 20%. Approximately how much did Peter pay for the suit, including 5% sales tax?
- A** \$120
  - B** \$125
  - C** \$135
  - D** \$140

Answer: B

- 43** Jill is putting a tile floor in her kitchen. She needs 52 tiles to cover the whole floor. There are 24 tiles in a box. A box costs \$23.95. Individual tiles cost \$2.95. Sales tax is 5%. Approximately how much will 52 tiles cost, including sales tax?
- A** \$50
  - B** \$57
  - C** \$60
  - D** \$63

Answer: D

## Algebra

### Understand and apply directly proportional relationships; relate to linear relationships:

**A.PA.07.01** Recognize when information given in a table, graph or formula suggests a proportional or linear relationship. [Fut]  
(No questions associated with this future core GLCE.)

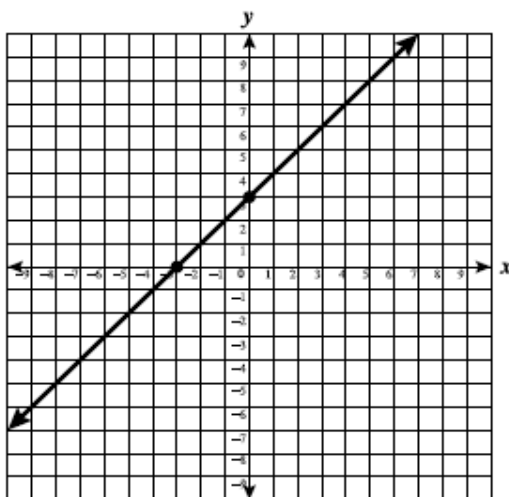
**A.RP.07.02** Represent directly proportional and linear relationships using verbal descriptions, tables, graphs and formulas, and translate among these representations.  
[Core]

**28** Tran saves \$0.25 each day during the month of December. Let  $d$  represent the date in December and  $m$  represent the money Tran saved. Which equation can be used to find the total amount of money Tran saved by any date in December?

- A  $m = 0.25d$
- B  $m = d \div 0.25$
- C  $m = d + 0.25$
- D  $m = d - 0.25$

Answer: A

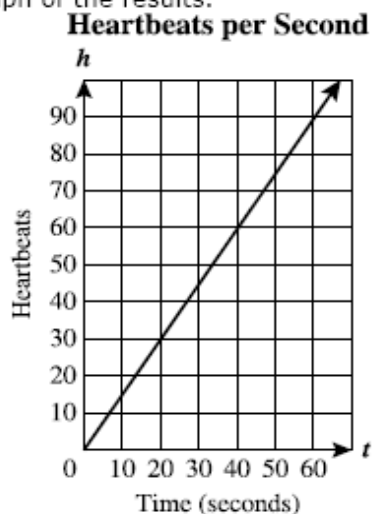
**47** What is the correct equation to find the points on the line in the graph below?



- A  $y = x + 3$
- B  $y = x - 3$
- C  $y = 2x + 3$
- D  $x = y + 3$

Answer: A

- 53 Sharona found the number of times her heart beat in 10, 20, 30, 40, 50, and 60 seconds. She made a graph of the results.



Which equation does Sharona's graph represent? Use  $h$  to represent "heartbeats" and  $t$  to represent "time in seconds."

- A  $t = 1.5h$
- B  $t = h + 10$
- C  $h = 1.5t$
- D  $h = t + 10$

Answer: C

**A.PA.07.03** Given a directly proportional or linear situation, graph and interpret the slope and intercept(s) in terms of the original situation; evaluate  $y = kx$  for specific  $x$  values, given  $k$ , e.g., weight vs. volume of water, base cost plus cost per unit. **[Fut]**  
**(No questions associated with this future core GLCE.)**

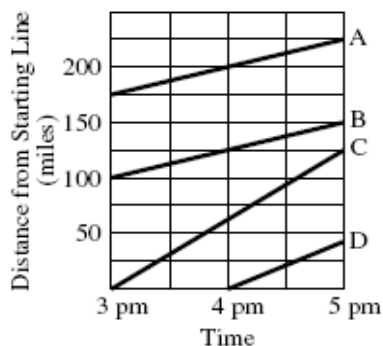
**A.PA.07.04** For directly proportional or linear situations, solve applied problems using graphs and equations; e.g., the heights and volume of a container with uniform crosssection; height of water in a tank being filled at a constant rate; degrees Celsius and degrees Fahrenheit; distance and time under constant speed. **[Core]**

- 9 Mrs. Flynn needs to take a taxi to the doctor's office. The taxi ride costs \$6.00 for the first mile and \$0.25 for each  $\frac{1}{10}$  mile thereafter. How much does Mrs. Flynn pay for a 2.3-mile taxi ride?

- A \$ 5.75
- B \$ 9.25
- C \$11.75
- D \$12.75

Answer: B

- 31 Four experimental cars, A, B, C, and D, are competing in a 500-mile race. Each car starts the course at a different time. Race officials record each car's distance from the starting line each hour. The following graph shows the location of each car from 3 p.m. to 5 p.m.



Which car was traveling at the *greatest* speed during the times observed?

- A Car A
- B Car B
- C Car C
- D Car D

Answer: C

- 39 An elevator can hold a maximum of 10 people who weigh an average of 180 pounds each. If a box of freight weighing 275 pounds is placed on the elevator, what strategy can be used to determine the number of people of average weight who can safely get on the elevator?

- A Solve  $275 + 180x = 1800$  and round down to the next whole number.
- B Solve  $180x = 1800 + 275$  and round up to the next whole number.
- C Solve  $275 + 180x = 1800$  and do not round.
- D Solve  $1800 + 180x = 275$  and do not round.

Answer: A

**A.PA.07.05** Understand and use directly proportional relationships of the form  $y = mx$ , and distinguish from linear relationships of the form  $y = mx + b$ ,  $b$  non-zero; understand that in a directly proportional relationship between two quantities one quantity is a constant multiple of the other quantity. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**Understand and represent linear functions:**

**A.PA.07.06** Calculate the slope from the graph of a linear function as the ratio of “rise/run” for a pair of points on the graph, and express the answer as a fraction and a decimal; understand that linear functions have slope that is a constant rate of change. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**A.PA.07.07** Represent linear functions in the form  $y = x + b$ ,  $y = mx$ , and  $y = mx + b$ , and graph, interpreting slope and y-intercept. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**A.FO.07.08** Know that the solution to a linear equation corresponds to the point at which its graph crosses the x-axis. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**Understand and solve problems about inversely proportional relationships:**

**A.PA.07.09** Recognize inversely proportional relationships in contextual situations; know that quantities are inversely proportional if their product is constant, e.g., the length and width of a rectangle with fixed area, and that an inversely proportional relationship is of the form  $y = k/x$  where  $k$  is some non-zero number. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**A.RP.07.10** Know that the graph of  $y = k/x$  is not a line; know its shape, and know that it crosses neither the x nor the y-axis. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**Apply basic properties of real numbers in algebraic contexts:**

**A.PA.07.11** Understand and use basic properties of real numbers: additive and multiplicative identities, additive and multiplicative inverses, commutativity, associativity, and the distributive property of multiplication over addition. **[Core]**

**13** Which of the following numbers does **NOT** have a multiplicative inverse?

**A**  $-\frac{1}{3}$

**B** 0

**C** 1

**D** 3

Answer: B

**21** Huyen is helping her friend Ida with math homework. She wants to explain the identity property of addition to Ida. Which of these equations should Huyen use as an example?

**A**  $1 + (2 + 3) = (1 + 2) + 3$

**B**  $15 + ^{-}15 = 0$

**C**  $8 + 12 = 12 + 8$

**D**  $11 + 0 = 11$

Answer: D

**36** What is equivalent to the value of  $3.1(5 - 4)$ ?

**A**  $15.5 - 12.4$

**B**  $3.1(^{-}20)$

**C**  $^{-}15.5 + 12.4$

**D**  $15.5 - 4$

Answer: A

**Combine algebraic expressions and solve equations:**

**A.FO.07.12** Add, subtract and multiply simple algebraic expressions of the first degree, e.g.,  $(92x + 8y) - 5x + y$ , or  $-2x(5x - 4)$ , and justify using properties of real numbers.

**[Core]**

**32** Which of the following is another way to represent this expression?

$$3a(b + 5c)$$

- A  $3a(5bc)$
- B  $3a(b) + 5c$
- C  $3a(b) + 3a(5c)$
- D  $(3a + b)(3a + 5c)$

Answer: C

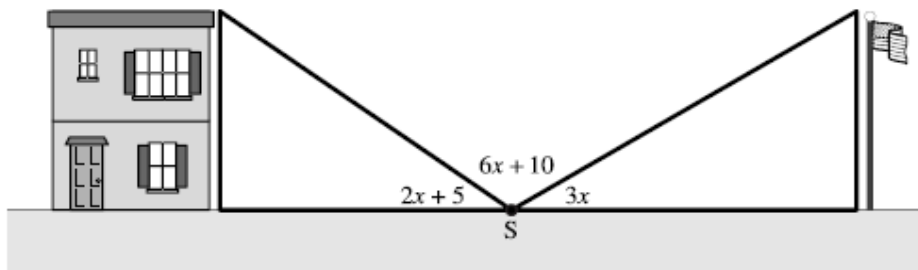
**40** Which of the following is another way to represent this expression?

$$3x + (2x - 1) + 5(x + 2)$$

- A  $10x + 4$
- B  $10x + 6$
- C  $10x + 9$
- D  $11x + 4$

Answer: C

**44** A surveyor stood at point S and measured the angles indicated below.



Which of the following equations could be used to find the number of degrees in each of these three angles?

*Number of degrees in a straight line = 180 degrees.*

- A  $11x + 15 = 180$
- B  $11x + 50 = 180$
- C  $12x + 15 = 180$
- D  $36x + 50 = 180$

Answer: A

**A.FO.07.13** From applied situations, generate and solve linear equations of the form  $ax + b = c$  and  $ax + b = cx + d$ , and interpret solutions. **[Fut]**  
**(No questions associated with this future core GLCE.)**

## Geometry

### Draw and construct geometric objects:

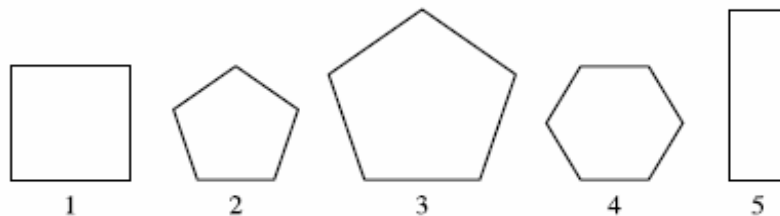
**G.SR.07.01** Use a ruler and other tools to draw squares, rectangles, triangles and parallelograms with specified dimensions. **[Core]**  
**(No questions associated with this core GLCE.)**

**G.SR.07.02** Use compass and straightedge to perform basic geometric constructions: the perpendicular bisector of a segment, an equilateral triangle, and the bisector of an angle; understand informal justifications. **[NASL]**

### Understand the concept of similar polygons, and solve related problems:

**G.TR.07.03** Understand that in similar polygons, corresponding angles are congruent and the ratios of corresponding sides are equal; understand the concepts of similar figures and scale factor. **[Core]**

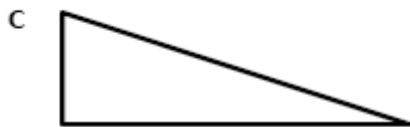
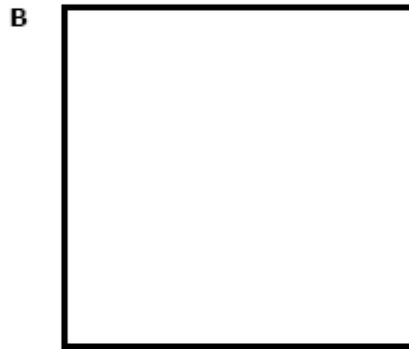
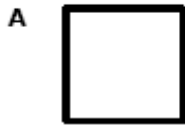
1 Which shapes in this group are similar?



- A 1 and 5
- B 2 and 3
- C 3 and 4
- D 2 and 4

Answer: B

5 Which of the following figures is similar to the given figure?



Answer: D

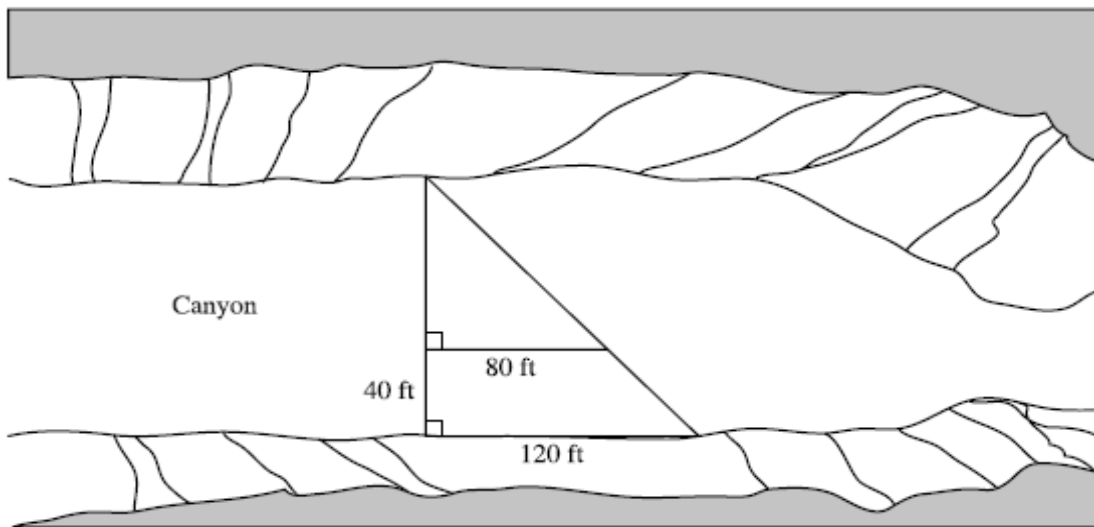
27 A company is selling a new book in two sizes. The dimensions of the bigger book will be 18 inches by 12 inches. The ratio of the dimensions of the two books will be 3:1. What will be the dimensions of the smaller book?

- A 54 inches  $\times$  36 inches
- B 15 inches  $\times$  9 inches
- C 6 inches  $\times$  4 inches
- D 3 inches  $\times$  1 inch

Answer: C

**G.TR.07.04** Solve problems about similar figures and scale drawings. **[Core]**

- 10** A surveyor is trying to find the distance across a canyon. The measurements he takes are pictured below.

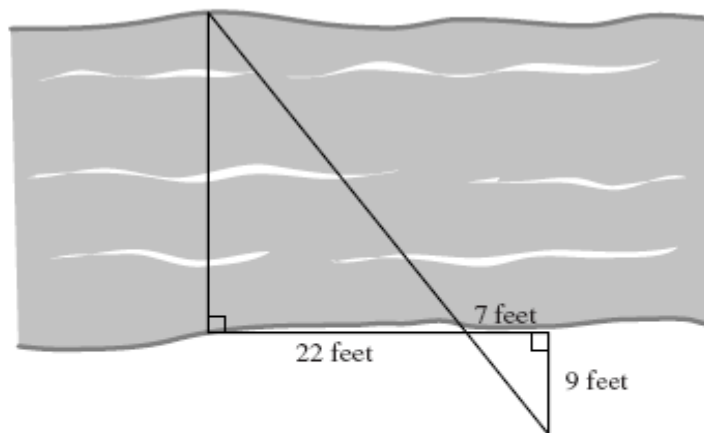


What is the *approximate* distance across the canyon?

- A** 20 feet
- B** 27 feet
- C** 80 feet
- D** 120 feet

Answer: D

- 34** A scout troop marked off similar triangles on the ground in order to find the distance across a river.

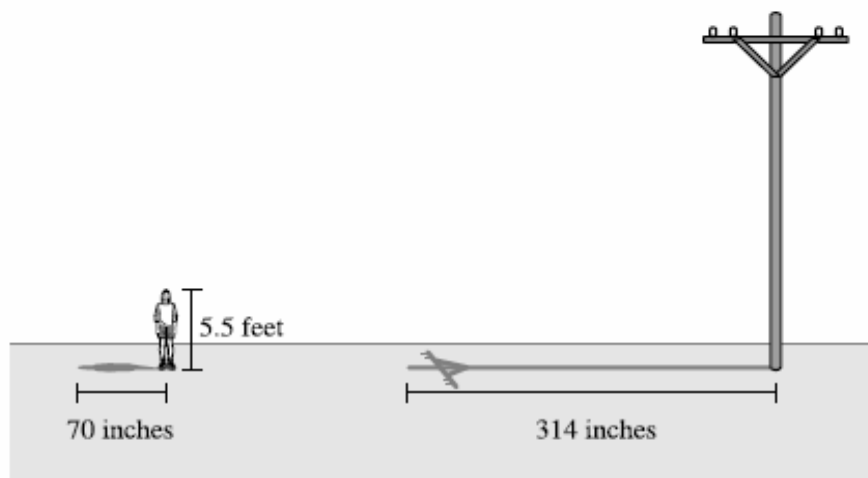


What is the approximate distance across the river?

- A** 17.1 feet
- B** 20 feet
- C** 24 feet
- D** 28.3 feet

Answer: D

- 49 A girl 5.5 feet tall casts a shadow 70 inches long at the same time that a telephone pole casts a 314-inch shadow. Which proportion **CANNOT** be used to find the height of the telephone pole?



- A  $\left(\frac{70}{5.5}\right) = \left(\frac{314}{x}\right)$
- B  $\left(\frac{70}{314}\right) = \left(\frac{5.5}{x}\right)$
- C  $\left(\frac{x}{5.5}\right) = \left(\frac{314}{70}\right)$
- D  $\left(\frac{70}{x}\right) = \left(\frac{5.5}{314}\right)$

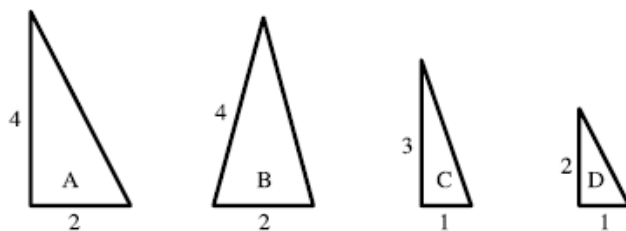
Answer: D

**G.TR.07.05** Show that two triangles are similar using the criteria: corresponding angles are congruent (AAA similarity); the ratios of two pairs of corresponding sides are equal and the included angles are congruent (SAS similarity); ratios of all pairs of corresponding sides are equal (SSS similarity); use these criteria to solve problems and to justify arguments. **[Core]**

- 22 Danielle is drawing two similar triangles in the sand. The smaller triangle has side lengths of 3 feet, 2 feet, and 4 feet. Two corresponding sides of the second triangle are 6 feet and 4 feet in length. What is the length of the third side of the larger triangle?
- A 4 feet
  - B 5 feet
  - C 6 feet
  - D 8 feet

Answer: D

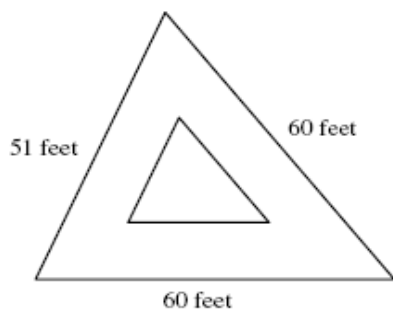
- 29 Which two triangles are similar?



- A triangle A and triangle B
- B triangle B and triangle D
- C triangle C and triangle A
- D triangle D and triangle A

Answer: D

- 45 Mr. Stephens races pigs at the county fair. He is designing a new race track and has built the exterior rails with the dimensions shown below.



The interior rails of the track need to form a smaller triangle similar to the exterior rails. Which of the following length rails can he use?

- A 20 feet, 20 feet, 11 feet
- B 17 feet, 20 feet, 20 feet
- C 120 feet, 120 feet, 102 feet
- D 6 feet, 6 feet, 5 feet

Answer: B

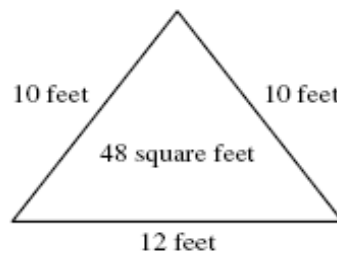
**G.TR.07.06** Understand and use the fact that when two triangles are similar with scale factor of  $r$ , their areas are related by a factor of  $r^2$ . **[Core]**

**50** Marcus is making a sailboat with two similar triangular sails. The side lengths of the larger sail are 3 times the dimensions of the smaller sail. How do the areas of the sails compare?

- A** The area of the larger sail is 3 times the area of the smaller sail.
- B** The area of the larger sail is 6 times the area of the smaller sail.
- C** The area of the larger sail is 9 times the area of the smaller sail.
- D** The area of the larger sail is 27 times the area of the smaller sail.

Answer: C

**52** Micajah is landscaping his backyard. The first flower bed he created is pictured below:

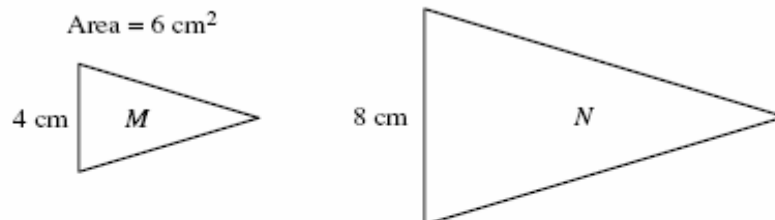


The second flower bed will be a similar triangle with an area of 12 square feet. What is the perimeter of the second flower bed?

- A** 11 feet
- B** 16 feet
- C** 26 feet
- D** 64 feet

Answer: B

**54** Triangles M and N are similar. What is the area of triangle N?



- A** 10 square centimeters
- B** 12 square centimeters
- C** 24 square centimeters
- D** 36 square centimeters

Answer: C

## Data and Probability

### Represent data and interpret:

**D.RE.07.01** Represent and interpret data using circle graphs, stem and leaf plots, histograms, and box-and-whisker plots, and select appropriate representation to address specific questions. **[Core]**

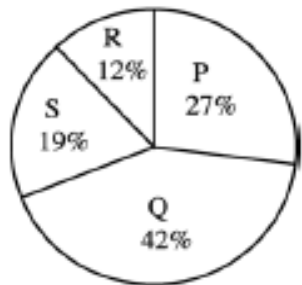
- 12 There were four candidates, P, Q, R, and S, in a local election. Each received a percentage of the total votes cast, as shown in the chart.

**Votes for Candidates**

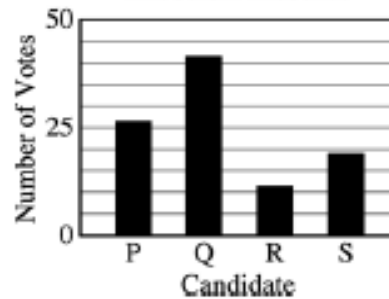
Candidate	Percent of Votes
P	27%
Q	42%
R	12%
S	19%

Which type of graph *best* illustrates the data?

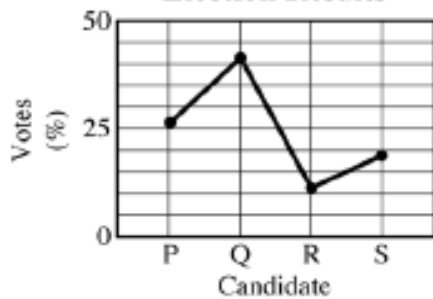
**A Election Results**



**B Election Results**



**C Election Results**



**D Election Results**

Stem	Leaf
1	2 9
2	7
3	
4	2

Key 1 | 2 = 12

Answer: A

- 19 Jeremiah made a data table of all his grades last quarter. Which statement about this data is true?

**Jeremiah's Quarter Averages**

Course	Grade
Art	85
Music	95
History	90
Math	96
English	87
Science	89

- A The mean is greater than the median, so there are more data points above the mean than below.
- B The mean is greater than the median, so there are more data points below the mean than above.
- C The mean is greater than the median, so there are more data points below the median than above.
- D The mean is less than the median, so there are more data points above the mean than below.

Answer: B

- 26 Mr. Perez's and Mr. Lewis's classes collected data about how many CDs each student owns.

Mr. Perez		Mr. Lewis
7620	0	155
320	1	0117
521100	2	566
	3	009
655000	4	
930	5	278
	6	5556
521	7	5
52	8	0
	9	02
9	10	5

Answer: B

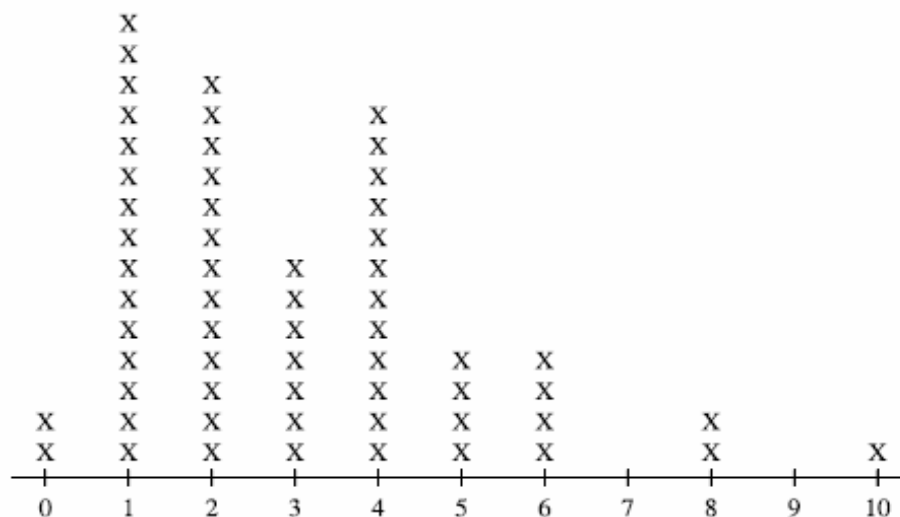
**D.AN.07.02** Create and interpret scatter plots and use an estimated line of best fit to answer questions about the data. **[Fut]**  
**(No questions associated with this future core GLCE.)**

**Compute statistics about datasets:**

**D.AN.07.03** Calculate and interpret relative frequencies and cumulative frequencies for given data sets. **[Core]**

- 2 Omar asked 60 people at the local mall how many movies they had rented in the past month. The line plot below displays the data he collected.

**Movie Rental Survey**



What is the mean number of movies rented by the people in Omar’s survey?

- A 1
- B 2.5
- C 3
- D 4

Answer: C

- 15 A class of 25 students got the following scores on a test:

73, 68, 91, 85, 88, 77, 94, 62, 68, 74, 77, 85, 82,  
78, 61, 66, 72, 77, 81, 93, 99, 84, 64, 75, 82.

The teacher did a tally of the grades and made a frequency table.

Interval	Tally	Frequency
60–69	I	6
70–79	III	8
80–89	II	7
90–99		5
Sum = 26		

When the teacher added the frequencies, he realized he had made an error. In which interval is the error?

- A 60–69
- B 70–79
- C 80–89
- D 90–99

Answer: D

33 The distribution of grades in the eighth grade is shown below.

Grade Range	Number of Grades
91–100	49
81–90	152
71–80	206
61–70	50
51–60	33

What is the relative frequency of grades in the 91–100 range?

- A 1%
- B 10%
- C 20%
- D 49%

Answer: B

**D.AN.07.04** Find and interpret the median, quartiles, and interquartile range of a given set of data. **[Core]**

- 38** Javier recorded the amount he spent on lunch each day for a month. If he wants to find the mode of the data, which of the following must he find?
- A** the average amount spent
  - B** the middle amount spent, when the amounts are ordered from least to greatest
  - C** the amount he spent most often
  - D** the difference between the greatest amount he spent and the least amount

Answer: C

- 46** Mrs. Hong took her grandchildren fishing every day when they visited her during the summer. The number of fish they caught each day is recorded in the table below.

Day	Number of Fish Caught
Tuesday	8
Wednesday	10
Thursday	2
Friday	5
Saturday	8
Sunday	12

What is the range of the data?

- A** 7.5
- B** 8
- C** 10
- D** 12

Answer: C

- 51** India counted the number of pages she wrote in her journal each week during her stay at her grandparents' house.

Week	Number of Pages Written
1	12
2	30
3	28
4	18

What is the median number of pages she wrote per week?

- A** 0
- B** 18
- C** 22
- D** 23

Answer: D