Mathematics, Grade 10 – Scoring Guide

A4D10

What are the *x*-intercepts for the function $f(x) = x^2 + 2x - 15$?

A. $(0, -5), (0, 3)$
B. $(0, 5), (0, -3)$
C. $(5, 0), (-3, 0)$
D. $(-5, 0), (3, 0)$ *

A2D10

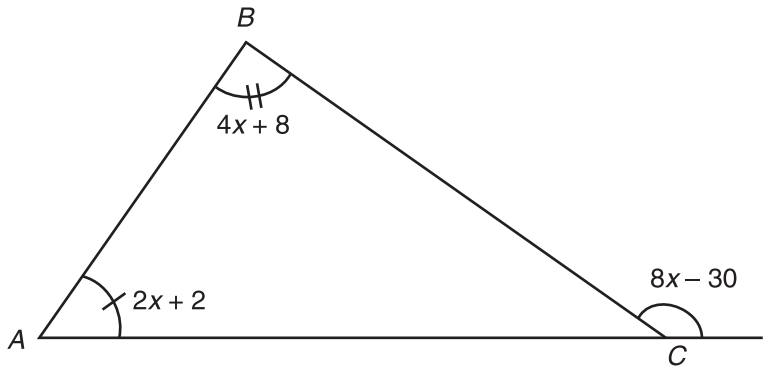
Solve for the intersection of the lines that these equations represent.

$3x + 4y = 10$ $\quad\quad$ $-6x - 8y = 20$

A. (2, 1)
B. $(-2, -1)$
C. infinite solution
D. no solution *

G1A10

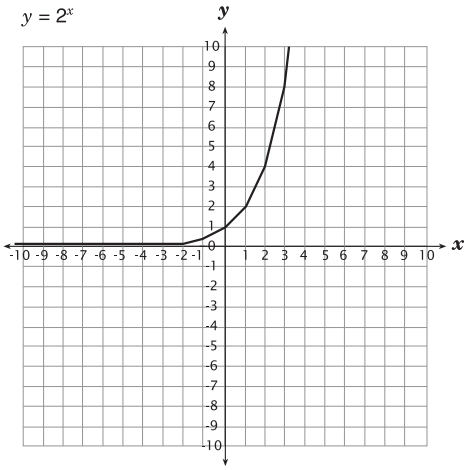
In the diagram shown, what is the measure of $\angle BAC$?



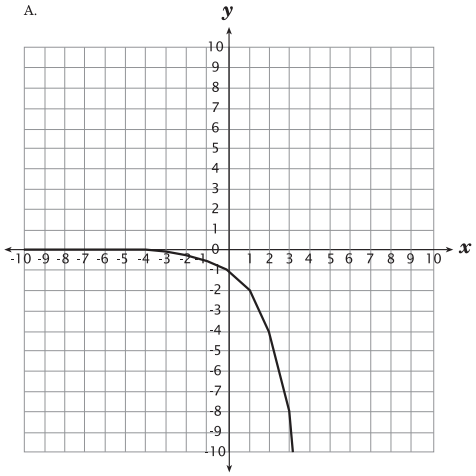
A. 30
B. 42 *
C. 50
D. 130

G3B10

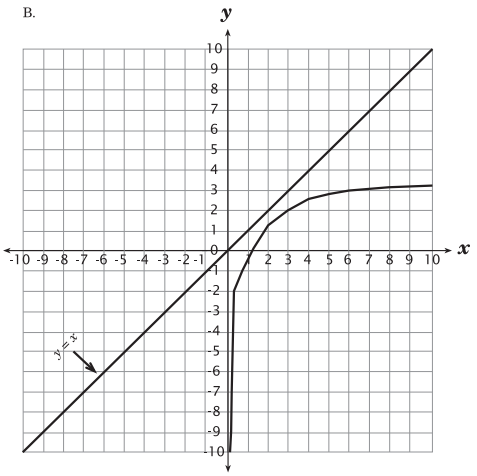
The sketch of $y = 2^x$ is shown below. Which of the following sketches shows the reflection of $y = 2^x$ across the y-axis?



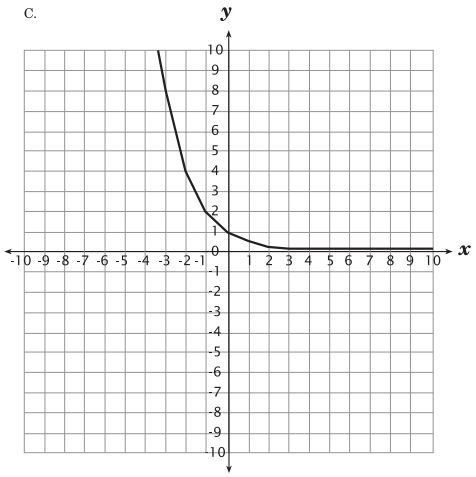
A.



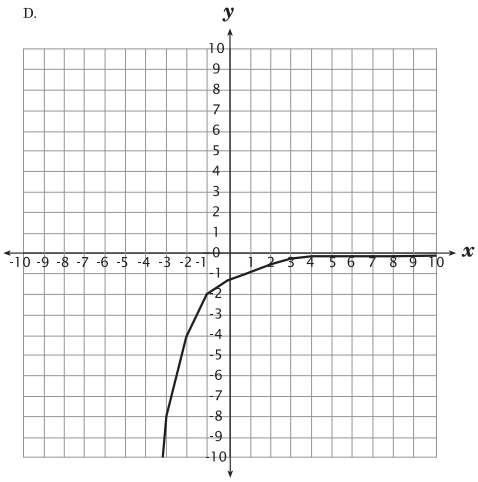
B.



* C.



D.



G2A10

A circle has a center at (2, ⁻3). One end point of a diameter is at (4, ⁻2). What are the coordinates of the other endpoint of that diameter?

A. (6, ⁻1)
B. (⁻2, 4)
C. (1, ⁻5)
D. (0, ⁻4) *

A1B10

Which equation would produce this pattern of numbers?

8, 10, 14, 22, . . .

A. $y = 6 + 2^x$ *
B. $y = 6 + x^2$
C. $y = 6 + 2x$
D. $y = 8 + 2^{(x-1)}$

A1C10

Look at this pattern.

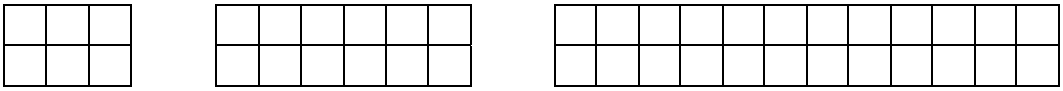
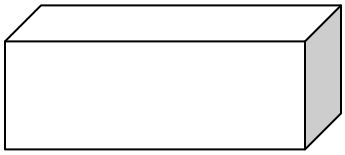


Figure:	1	2	3
Area:	6	12	24

What is the area of the 13th figure in this pattern?

A. 6,144
B. 12,288
C. 24,576 *
D. 49,152

G1B10
A rectangular prism has a volume of 324 cubic inches. If the lengths of all edges are doubled, what will be the volume in cubic inches of the new prism?



A. 648
B. 1296
C. 1944
D. 2592 *

G3B10
The graph of the quadratic equation $y = (x + 1)^2 - 3$ is reflected across the y-axis and then translated 2 units down. Which are the coordinates of the vertex of the new graph?

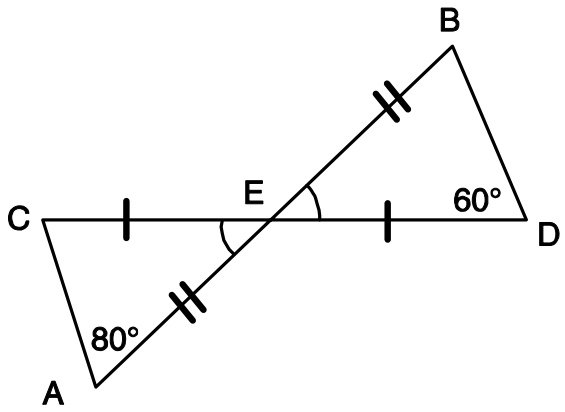
A. $(-1, 1)$
B. $(1, -1)$
C. $(1, -5)$ *
D. $(-1, -5)$

A3A10
Which type of function would produce the data shown in the table?

x	*y*
1	–2
3	6
4	7
6	3

A. linear
B. quadratic *
C. cubic
D. exponential

Use the figure below to answer question __ .



G1A10

Line segments *AB* and *CD* bisect each other at *E*. The measure of $\angle CAE$ = 80° and $m\angle BDE$ = 60°. Amy says that $m\angle CEA$ = 20°, Brent says that it is 30°, Carlos says that it is 40°, and Debra says it that is 50°. Which student is correct?

A. Amy
B. Brent
C. Carlos *
D. Debra

A1E10

If the graph of the function $f(x) = x^2 + 1$ is shifted down 5 units, what are the coordinates of the x-intercepts in the new graph? Provide work that shows how you arrived at your answer.

Exemplary response: x-intercepts will be (2, 0) and ($^-$2, 0); table and/or graph that shows these intercepts, **or** other explanation

Scoring Guide:

2 points – a correct answer **and** explanation
1 point – a correct answer **or** correct explanation
0 points - other

A2D10

Yummy Bakery and Oh So Good Bakery had a contest with these results: Yummy sold 9 fewer rolls than twice what Oh So Good sold. Together they sold a total of 639 rolls. Find the number of rolls sold by each bakery. Provide the work that shows how you arrived at your answer.

Exemplary response: Yummy Bakery = 423 rolls, Oh So Good = 216 rolls; Yummy = y, Oh So Good = g; $y + g = 639$; $y = 2g - 9$; $3g - 9 = 639$; $3g = 648$; $g = 216$; $y = 639 - 216 = 423$

Scoring Guide:

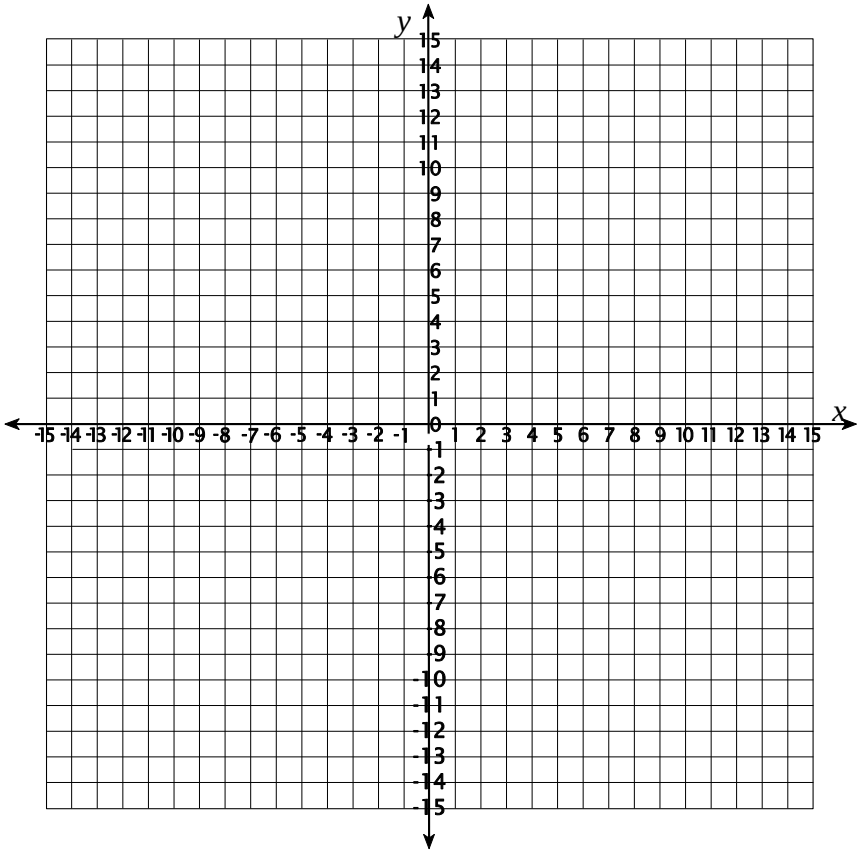
2 points – a correct answer **and** explanation
1 point – a correct answer **or** correct explanation
0 points - other

Yummy Bakery: _____

Oh So Good Bakery: _____

G2A10

Plot these points: *A* (¯3, 4); *B* (3, 6); and *C* (4, ¯1) on the coordinate graph. Then plot point *D* on the graph so that the quadrilateral formed is a parallelogram. Show the work necessary to verify that the figure formed is a parallelogram.



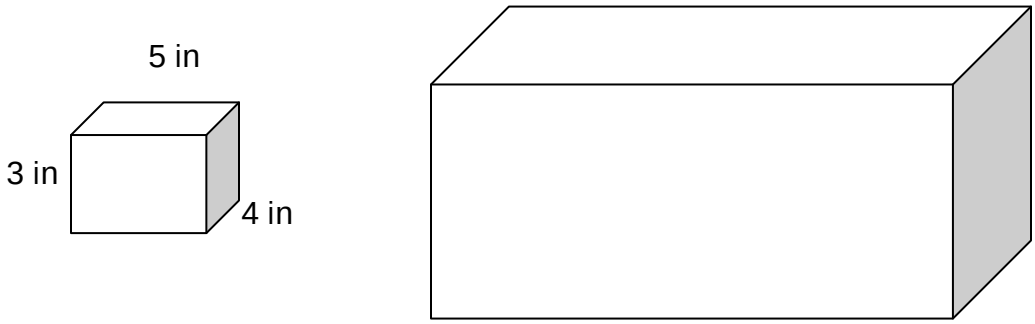
Exemplary response – Correctly plots all 4 points (note: D could be any of (¯2, ¯3), (¯4, 11), or (10, 1)); work could include: slopes of both pairs of opposite sides, lengths of both pairs of opposite sides; etc.

Scoring Guide:

2 points – a correct answer **and** explanation
1 point – a correct answer **or** correct explanation
0 points - other

G1B10

The figures shown are two similar rectangular prisms. The smaller one has a length of 5 in, width of 4 in, and height of 3 in. Each dimension of the smaller prism has been tripled to make the larger prism.



What is the ratio of the volumes of these two prisms? Provide the work that shows how you arrived at your answer and write your answer on the line.

Exemplary response: the ratio of volumes is 27 to 1 (or 1 to 27)

Scoring Guide:

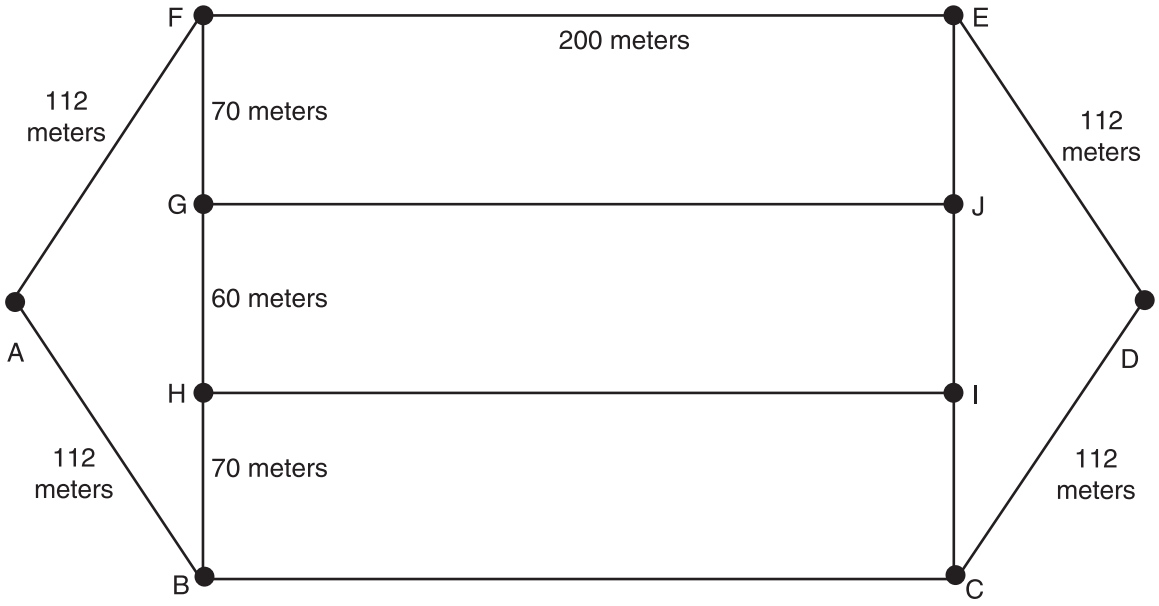
2 points – a correct answer (27 to 1, or 1 to 27) **and** correct process
1 point – a correct answer **or** correct process
0 points - other

Ratio: _____

Performance Events:

PE-01, G4B10

Ryetown has decided to replace the sewer lines in its Dogwood Subdivision. Every house in the subdivision must be connected to the new sewer line. The diagram shows the houses (as capital letters) and all of the ***possible*** connecting paths along which the new sewer line could be dug. The new line needs ***only*** to connect each of the houses in a single, continuous path. The path segments shown are measured in meters (m).



As project engineer, you need to develop three possible routes for digging the new sewer line, one of which is the shortest route. The ditch digging machine can dig a sewer line at the rate of one meter every 1.5 meters, but it cannot retrace its path. Give each of your 3 routes and their lengths, along with the amount of time the company would save if it chose the shortest route.

Route 1 Pathway: _____

Route 1 length: _____ meters

Route 2 Pathway: _____

Route 2 length: _____ meters

Route 3 Pathway: _____

Route 3 length: _____ meters

Amount of time saved by using the shortest route: _____ minutes

Exemplary response –

Route 1 Pathway: A, F, G, H, B, C, I, J, E, D
Length: 824 meters
Route 2 Pathway: A, B, H, G, F, E, J, I, C, D
Length: 824 meters
Route 3 Pathway: H, I, C, B, A, F, G, J, E
Length: 1146 meters
Routes 1 and 2 are shorter by 326 meters, which would save about 480 minutes compared to Route 3.

Scoring Guide:

4 points: The student's response fully addresses the performance event by:

- demonstrating knowledge of patterns and linear concepts needed to complete the event by creating appropriate routes for the sewer line
- communicating all process components that lead to an appropriate and systematic solution, including adequate explanation for the shortest route
- having only minor flaws with no effect on the reasonableness of the solution

3 points: The student's response substantially addresses the performance event by:

- demonstrating knowledge of patterns and linear concepts needed to complete the event by creating appropriate routes for the sewer line
- communicating most process components that lead to an appropriate and systematic solution
- having minor flaws with minimal effect on the reasonableness of the solution

2 points: The student's response partially addresses the performance event by:

- demonstrating a limited knowledge of patterns and linear concepts needed to complete the event, such as inappropriate routes for the sewer line
- communicating some process components, such as an inadequate explanation of the shortest route
- having flaws or extraneous information

1 point – The student's response minimally addresses the performance event by:

- demonstrating a limited knowledge of patterns and/or linear concepts needed to complete the event, such as incorrect routes for the sewer line
- communicating few or no process components, such as no explanation for the shortest route
- having flaws or extraneous information that indicates a lack of understanding or confusion

0 points – Other; such as merely copying prompt information.

PE-04, G4B10

Afarm, Inc. has set aside a rectangular field measuring 2,275 feet by 1,500 feet for production of grain. The average yield from this field is 2,250 pounds of grain per acre (1 acre = 43,560 square feet).

You must present a plan to the CEO of Afarm, Inc. for purchasing storage units for this grain. The storage units come in two sizes, each of which is cylindrical in shape. Your plan must stay under a budget of $200,000.

Storage Unit A: 45 feet tall, diameter = 18 feet; cost = $31,000
Storage Unit B: 70 feet tall, diameter = 20 feet; cost = $60,000

Each storage unit can store 7.9 pounds of grain per cubic foot.

Write a memo to Afarm's CEO that presents your plan for storing the grain. Provide the work that shows how you arrived at your plan, including the expected amount of grain, calculations of volume for each storage unit, the number of each type of unit that should be bought and the total cost of your plan.

Qty. of Unit A to purchase: _____ Qty. of Unit B to purchase _____

Total cost of purchase: $ _____

Exemplary response –

Area of grain field = 2275 x 1500 = 3,412,500 ft^2

3,412,500 ft^2 / 43,560 ft^2/acre = 78.34 acres

78.34 acres x 2250 pounds/acre = 176,265 total pounds of grain (expected yield)

Volume of storage unit A = $\pi r^2 h$ = $\pi r 9ft^2 45ft$ = 11,451 ft^3; this unit can store 11,450 ft^3 x 7.9 pounds/ft^3 = 90, 463 pounds

Volume of storage unit B = $\pi r^2 h$ = $\pi r 10ft^2 70ft$ = 21,9911 ft^3; this unit can store 11,450 ft^3 x 7.9 pounds/ft^3 = 173,730 pounds

Storage units needed: two of Unit A, at a cost of $62,000

Scoring Guide:

4 points: The student's response fully addresses the performance event by:

- demonstrating knowledge of geometrical and mathematical concepts needed to complete the event by performing accurate calculations of sizes of the grain storage buildings
- communicating all process components that lead to an appropriate and systematic solution, including appropriate explanation of which silo (or set of silos) is best for dealing with the hay storage issue
- having only minor flaws with no effect on the reasonableness of the solution

3 points: The student's response substantially addresses the performance event by:

- demonstrating knowledge of geometrical and mathematical concepts needed to complete the event by performing generally calculations
- communicating most process components that lead to an appropriate and systematic solution
- having minor flaws with minimal effect on the reasonableness of the solution

2 points: The student's response partially addresses the performance event by:

- demonstrating a limited knowledge of geometrical and mathematical concepts needed to complete the event, such as an inaccurate calculations
- communicating some process components that lead to an appropriate and systematic solution, such as an inadequate explanation of the solution to the hay storage issue
- having flaws or extraneous information

1 point – The student's response minimally addresses the performance event by:

- demonstrating a limited knowledge of geometrical and/or mathematical concepts needed to complete the event, such as performing inaccurate calculations
- communicating few or no process components
- having flaws or extraneous information that indicates a lack of understanding or confusion

0 points – Other; such as merely copying prompt information.