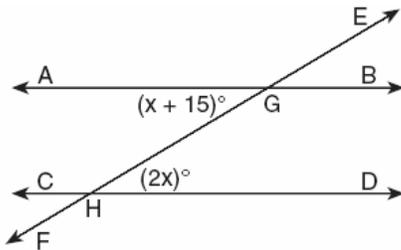


1. 010401a, P.I. A.A.22  
If  $2(x + 3) = x + 10$ , then  $x$  equals  
[A] 7 [B] 14 [C] 5 [D] 4

2. 010402a, P.I. 8.A.12  
In the accompanying diagram, parallel lines  $\overline{AB}$  and  $\overline{CD}$  are intersected by transversal  $\overline{EF}$  at points  $G$  and  $H$ , respectively,  $m\angle AGH = x + 15$ , and  $m\angle GHD = 2x$ .



Which equation can be used to find the value of  $x$ ?

- [A]  $2x + x + 15 = 90$  [B]  $2x(x + 15) = 0$   
[C]  $2x + x + 15 = 180$  [D]  $2x = x + 15$
3. 010403a, P.I. 7.N.13  
On February 18, from 9 a.m. until 2 p.m., the temperature rose from  $-14^\circ\text{F}$  to  $36^\circ\text{F}$ .  
What was the total increase in temperature during this time period?  
[A]  $22^\circ$  [B]  $32^\circ$  [C]  $36^\circ$  [D]  $50^\circ$
4. 010404a  
Which statement about quadrilaterals is true?  
[A] All quadrilaterals have equal sides.  
[B] All quadrilaterals are parallelograms.  
[C] All quadrilaterals have four right angles.  
[D] All quadrilaterals have four sides.

5. 010405a, P.I. A.N.7  
In a school building, there are 10 doors that can be used to enter the building and 8 stairways to the second floor. How many different routes are there from outside the building to a class on the second floor?  
[A] 10 [B] 18 [C] 1 [D] 80

6. 010406a, P.I. 8.N.2  
What is the value of  $\frac{x^2 - 4y}{2}$ , if  $x = 4$  and  $y = -3$ ?  
[A] 10 [B] 2 [C] 14 [D] -2

7. 010407a  
Given the true statements: "Jason goes shopping or he goes to the movies" and "Jason does not go to the movies." Which statement must also be true?  
[A] Jason does not go shopping and he does not go to the movies.  
[B] Jason stays home.  
[C] Jason goes shopping.  
[D] Jason does not go shopping.

8. 010408a, P.I. 8.G.16  
An equation of the line that has a slope of 3 and a y-intercept of -2 is  
[A]  $x = 3y - 2$  [B]  $y = -x$   
[C]  $y = 3x - 2$  [D]  $y = -2x + 3$

9. 010409a, P.I. G.G.22

In the accompanying diagram, line  $l_1$  is parallel to line  $l_2$ .

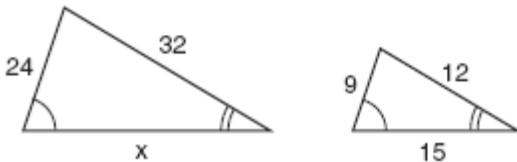


Which term describes the locus of all points that are equidistant from line  $l_1$  and  $l_2$ ?

- [A] circle                      [B] line  
[C] rectangle                 [D] point

10. 010410a, P.I. G.G.45

The accompanying diagram shows two similar triangles.

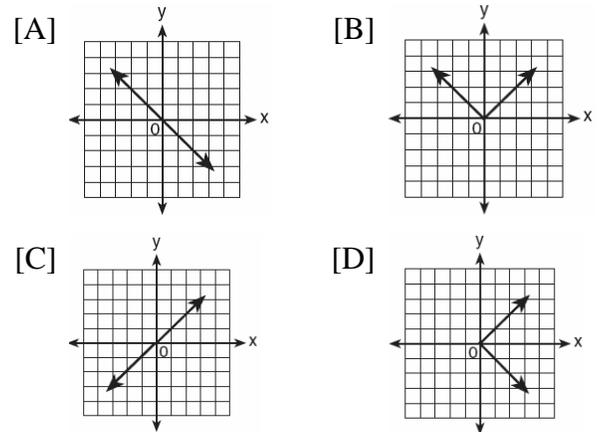


Which proportion could be used to solve for  $x$ ?

- [A]  $\frac{32}{x} = \frac{12}{15}$                  [B]  $\frac{24}{9} = \frac{15}{x}$   
[C]  $\frac{x}{24} = \frac{9}{15}$                     [D]  $\frac{32}{12} = \frac{15}{x}$

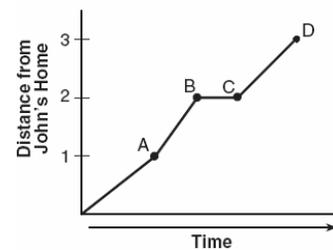
11. 010411a

Which graph is symmetric with respect to the  $y$ -axis?



12. 010412a, P.I. 8.A.3

John left his home and walked 3 blocks to his school, as shown in the accompanying graph.



What is one possible interpretation of the section of the graph from point  $B$  to point  $C$ ?

- [A] John waited before crossing a busy street.  
[B] John reached the top of a hill and began walking on level ground.  
[C] John arrived at school and stayed throughout the day.  
[D] John returned home to get his mathematics homework.

13. 010413a, P.I. A.A.12

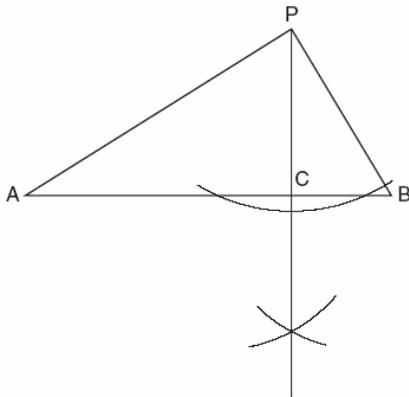
The expression  $8^{-4} \cdot 8^6$  is equivalent to

- [A]  $8^{10}$     [B]  $8^2$     [C]  $8^{-2}$     [D]  $8^{-24}$



20. 010420a, P.I. G.G.19

In the accompanying diagram of a construction, what does  $\overline{PC}$  represent?



- [A] the bisector of  $\angle APB$
- [B] a median drawn to  $\overline{AB}$
- [C] an altitude drawn to  $\overline{AB}$
- [D] the perpendicular bisector of  $\overline{AB}$

21. 010421a, P.I. A.A.23

If  $2ax - 5x = 2$ , then  $x$  is equivalent to

- [A]  $\frac{2+5a}{2a}$
- [B]  $\frac{1}{a-5}$
- [C]  $7-2a$
- [D]  $\frac{2}{2a-5}$

22. 010422a, P.I. A2.A.13

If  $a > 0$ , then  $\sqrt{9a^2 + 16a^2}$  equals

- [A]  $\sqrt{7a}$
- [B]  $5\sqrt{a}$
- [C]  $5a$
- [D]  $7a$

23. 010423a, P.I. A.A.17

What is the sum of  $\frac{2}{x}$  and  $\frac{x}{2}$ ?

- [A]  $\frac{2+x}{2x}$
- [B]  $\frac{4+x^2}{2x}$
- [C] 1
- [D]  $\frac{4+x}{2x}$

24. 010424a, P.I. A2.S.11

Five people have volunteered to work on an awards dinner at Madison High School. How many different committees of four can be formed from the five people?

- [A] 5
- [B] 1
- [C] 10
- [D] 20

25. 010425a, P.I. A.A.24

The inequality  $\frac{1}{2}x + 3 < 2x - 6$  is equivalent to

- [A]  $x > 6$
- [B]  $x > -\frac{5}{6}$
- [C]  $x < -\frac{5}{6}$
- [D]  $x < 6$

26. 010426a

In the coordinate plane, the points (2,2) and (2,12) are the endpoints of a diameter of a circle. What is the length of the radius of the circle?

- [A] 6
- [B] 7
- [C] 5
- [D] 10

27. 010427a, P.I. A.A.1

Which expression represents the number of yards in  $x$  feet?

- [A]  $\frac{x}{12}$
- [B]  $\frac{x}{3}$
- [C]  $12x$
- [D]  $3x$

28. 010428a, P.I. A.N.1

Which equation illustrates the associative property of addition?

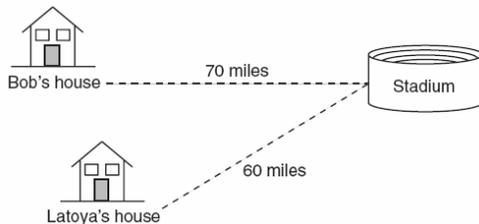
- [A]  $(3 + x) + y = 3 + (x + y)$
- [B]  $3 + x = 0$
- [C]  $3(x + 2) = 3x + 6$
- [D]  $x + y = y + x$

29. 010429a, P.I. A.A.13

If  $2x^2 - x + 6$  is subtracted from  $x^2 + 3x - 2$ , the result is

- [A]  $x^2 - 4x + 8$
- [B]  $-x^2 + 2x - 8$
- [C]  $x^2 + 2x - 8$
- [D]  $-x^2 + 4x - 8$

30. 010430a, P.I. A.A.13  
The expression  $(a^2 + b^2)^2$  is equivalent to  
[A]  $a^4 + 4a^2b^2 + b^4$     [B]  $a^4 + b^4$   
[C]  $a^4 + a^2b^2 + b^4$     [D]  $a^4 + 2a^2b^2 + b^4$
31. 010431a, P.I. A.N.5  
Julio's wages vary directly as the number of hours that he works. If his wages for 5 hours are \$29.75, how much will he earn for 30 hours?
32. 010432a, P.I. A.A.6  
TOP Electronics is a small business with five employees. The mean (average) weekly salary for the five employees is \$360. If the weekly salaries of four of the employees are \$340, \$340, \$345, and \$425, what is the salary of the fifth employee?
33. 010433a, P.I. A.A.6  
Bob and Latoya both drove to a baseball game at a college stadium. Bob lives 70 miles from the stadium and Latoya lives 60 miles from it, as shown in the accompanying diagram. Bob drove at a rate of 50 miles per hour, and Latoya drove at a rate of 40 miles per hour. If they both left home at the same time, who got to the stadium first?

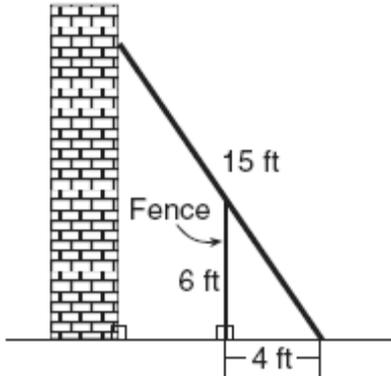


34. 010434a, P.I. A.RP.11  
A car dealer has 22 vehicles on his lot. If 8 of the vehicles are vans and 6 of the vehicles are red, and 10 vehicles are neither vans nor red, how many red vans does he have on his lot?

35. 010435a, P.I. A.N.8  
In Jackson County, Wyoming, license plates are made with two letters (*A* through *Z*) followed by three digits (0 through 9). The plates are made according to the following restrictions:  
o the first letter must be *J* or *W*, and the second letter can be any of the 26 letters in the alphabet  
o no digit can be repeated  
How many different license plates can be made with these restrictions?
36. 010436a, P.I. A.A.7  
Using only 32-cent and 20-cent stamps, Charlie put \$3.36 postage on a package he sent to his sister. He used twice as many 32-cent stamps as 20-cent stamps. Determine how many of *each* type of stamp he used.
37. 010437a, P.I. A.G.1  
A wheel has a radius of 5 feet. What is the minimum number of *complete* revolutions that the wheel must make to roll at least 1,000 feet?

38. 010438a, P.I. A.A.43

In the accompanying diagram, the base of a 15-foot ladder rests on the ground 4 feet from a 6-foot fence.



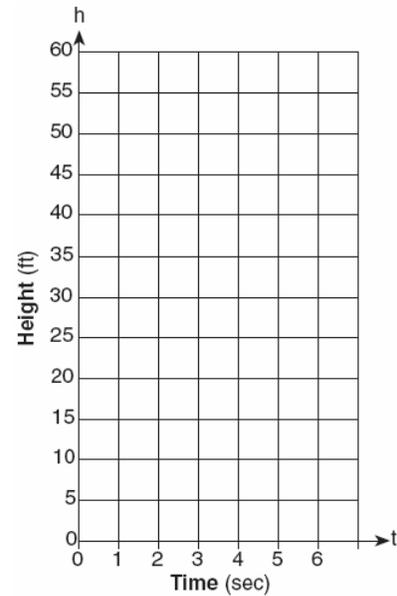
*a* If the ladder touches the top of the fence and the side of a building, what angle, to the nearest degree, does the ladder make with the ground?

*b* Using the angle found in part *a*, determine how far the top of the ladder reaches up the side of the building, to the nearest foot.

39. 010439a, P.I. A.G.4

Tom throws a ball into the air. The ball travels on a parabolic path represented by the equation  $h = -8t^2 + 40t$ , where  $h$  is the height, in feet, and  $t$  is the time, in seconds.

*a* On the accompanying set of axes, graph the equation from  $t = 0$  to  $t = 5$  seconds, including all integral values of  $t$  from 0 to 5.



*b* What is the value of  $t$  at which  $h$  has its greatest value?

- [1] D
- [2] D
- [3] D
- [4] D
- [5] D
- [6] C
- [7] C
- [8] C
- [9] B
- [10] A
- [11] B
- [12] A
- [13] B
- [14] A
- [15] C
- [16] B
- [17] A
- [18] D
- [19] C
- [20] C
- [21] D
- [22] C
- [23] B
- [24] A
- [25] A
- [26] C
- [27] B
- [28] A

- [29] D
- [30] D

[2] \$178.50, and appropriate work is shown, such as solving a proportion, using a table, or trial and error with at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational error is made.

or [1] An appropriate proportion is set up, but no solution or an incorrect solution is found.

or [1] An incorrect proportion is set up, but an appropriate solution is found.

or [1] \$178.50, but no work is shown or fewer than three trials with appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

- [31] incorrect procedure.

[2] \$350, and appropriate work is shown,

such as  $\frac{1450+x}{5} = 360$  or trial and error with

at least three trials and appropriate checks.

[1] Appropriate work is shown, but one computational error is made.

or [1] The total of the five salaries is shown to be  $5 \times 360 = 1800$ , but no further correct work is shown.

or [1] \$350, but no work is shown or fewer than three trials with appropriate checks are shown.

[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously

- [32] incorrect procedure.

- [2] Bob, and appropriate work is shown, such as using the distance formula to calculate the two travel times or setting up a proportion.  
[1] Appropriate work is shown, but one computational or conceptual error is made, but an appropriate answer is found.  
or [1] Appropriate work is shown, but no answer or an incorrect answer is found.  
[0] Bob, but no work or inappropriate work is shown.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

- [2] 2, and appropriate work is shown, such as a Venn diagram, a listing, or an explanation.  
[1] Appropriate work is shown, but one computational or conceptual error is made.  
or [1] 2, but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

- [2] 37,440 and appropriate work is shown, such as  $2 \times 26 \times 10 \times 9 \times 8$  or  ${}_2P_1 \times {}_{26}P_1 \times {}_{10}P_1 \times P_3$ .  
[1] Appropriate work is shown, but one computational or conceptual error is made.  
or [1] Appropriate work is shown for at least one restriction, such as  $2 \times 26$  or  $10 \times 9 \times 8$ .  
or [1] 37,440 but no work is shown.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

- [3] Four 20-cent and eight 32-cent stamps, and appropriate work is shown, such as a system of equations, or a linear equation such as  $2x(.32) + .20x = 3.36$ , or trial and error with at least three trials and appropriate checks.  
[2] Appropriate work is shown, but one computational error is made, but appropriate quantities are found for each stamp.  
or [2] Appropriate work is shown, but the quantity for only one of the stamps is found.  
or [2] Appropriate work is shown, but the solutions are not labeled or the labels are reversed.  
or [2] The trial-and-error method is used to find correct solutions, but only two trials and appropriate checks are shown.  
[1] Appropriate work is shown, but two or more computational errors are made, but appropriate quantities are found for each stamp.  
or [1] The trial-and-error method is attempted, and at least six systematic trials and appropriate checks are shown, but no solution is found.  
or [1] An incorrect equation or system of equations of equal difficulty is solved appropriately for both solutions.  
or [1] A correct equation or system of equations is written, but no further correct work is shown.  
or [1] Four 20-cent and eight 32-cent stamps, but no work or only one trial with an appropriate check is shown.  
[0] Four and eight, but no work is shown, and the solutions are not labeled.  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- 

[36]

- [3] 32, and appropriate work is shown, such as finding the circumference to be  $10\pi$  and dividing 1,000 by  $10\pi$ .
- [2] Appropriate work is shown, but one computational or rounding error is made or the answer is expressed in terms of  $\pi$ .
- [1] An incorrect circumference formula is used, but an appropriate number of revolutions is found.
- or [1] The circumference of the wheel is found to be  $10\pi$  or an equivalent decimal, but no further correct work is shown.
- or [1] 32, but no work is shown.
- [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [37] \_\_\_\_\_

- a [2] 56, and appropriate work is shown, such as  $\tan A = \frac{6}{4}$  or finding the hypotenuse and then using sine or cosine or using proportional sides of similar triangles.
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or [1] Appropriate work is shown, but one conceptual error is made.
- or [1] The length of the hypotenuse is found correctly, but no further correct work is shown.
- or [1] 56, but no work is shown.
- b [2] 12, and appropriate work is shown, such as  $\sin 56 = \frac{h}{15}$ .
- or [2] An appropriate answer is found based on an incorrect angle found in part a.
- [1] Appropriate work is shown, but one computational or rounding error is made.
- or [1] Appropriate work is shown, but one conceptual error is made.
- or [1] 12, but no work is shown.
- a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [38] \_\_\_\_\_

- a [3] A parabola with points graphed at (0,0), (1,32), (2,48), (3,48), (4,32), and (5,0) is shown. [Points do not have to be labeled on the graph for full credit.]
- [2] Appropriate work is shown, such as a table of values, but one graphing error is made.
- or [2] The correct points are graphed, but the parabola is drawn incorrectly, such as connecting (2,48) and (3,48) as a line segment or not connecting the points at all.
- or [2] At least four correct values are found, and the parabola is graphed appropriately.
- or [2] A correct table of values is shown for all values from 0 to 5, but no graph is drawn.
- [1] Two or three correct values are found, and the parabola is graphed appropriately.
- or [1] A correct table of values is shown for an incorrectly transcribed equation, such as  $h = 8t^2 + 40t$ , but no graph is drawn.
- b [1] 2.5 is found algebraically or identified from a table or from the graph of the parabola.
- or [1] An appropriate value of t is found, based on an incorrect graph.
- or [1]  $2 < t < 3$  is given as the range of values based on the line segment drawn in part a.
- a and b [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
- [39] \_\_\_\_\_