

1. 080001a, P.I. A.A.12

The product of  $2x^3$  and  $6x^5$  is

- [A]  $10x^8$                       [B]  $10x^{15}$   
[C]  $12x^8$                       [D]  $12x^{15}$

2. 080002a, P.I. A.A.1

A hockey team played  $n$  games, losing four of them and winning the rest. The ratio of games won to games lost is

- [A]  $\frac{n-4}{4}$     [B]  $\frac{4}{n-4}$     [C]  $\frac{4}{n}$     [D]  $\frac{n}{4}$

3. 080003a, P.I. G.G.22

In the coordinate plane, what is the total number of points 5 units from the origin and equidistant from both the  $x$ - and  $y$ -axes?

- [A] 2      [B] 4      [C] 1      [D] 0

4. 080004a, P.I. 7.N.6

Expressed in decimal notation,  $4.726 \times 10^{-3}$  is

- [A] 4,726                      [B] 0.004726  
[C] 0.04726                      [D] 472.6

5. 080005a

Which table does *not* show an example of direct variation?

[A] 

$x$	$y$
-4	-20
-3	-15
-2	-10
-1	-5

[B] 

$x$	$y$
1	$\frac{1}{2}$
2	1
3	$\frac{3}{2}$
4	2

[C] 

$x$	$y$
2	24
4	12
6	8
8	6

[D] 

$x$	$y$
1	4
2	8
3	12
4	16

6. 080006a, P.I. 7.N.3

If  $a < b$ ,  $c < d$ , and  $a$ ,  $b$ ,  $c$ , and  $d$  are all greater than 0, which expression is always true?

- [A]  $a - c + b - d = 0$       [B]  $\frac{a}{d} > \frac{b}{c}$   
[C]  $ac < bd$                       [D]  $a + c > b + d$

7. 080007a

The volume of a cube is 64 cubic inches. Its total surface area, in square inches, is

- [A] 48      [B] 576      [C] 16      [D] 96

8. 080008a, P.I. A2.S.3

On an English examination, two students received scores of 90, five students received 85, seven students received 75, and one student received 55. The average score on this examination was

- [A] 76      [B] 75      [C] 77      [D] 79

9. 080009a, P.I. A.A.38

Which equation represents a line parallel to the line  $y = 2x - 5$ ?

[A]  $y = 5x - 2$       [B]  $y = 2x + 5$

[C]  $y = -\frac{1}{2}x - 5$       [D]  $y = -2x - 5$

10. 080010a, P.I. A.N.1

The operation  $*$  for the set  $\{p, r, s, v\}$  is defined in the accompanying table. What is the inverse element of  $r$  under the operation  $*$ ?

$*$	$p$	$r$	$s$	$v$
$p$	$s$	$v$	$p$	$r$
$r$	$v$	$p$	$r$	$s$
$s$	$p$	$r$	$s$	$v$
$v$	$r$	$s$	$v$	$p$

[A]  $s$       [B]  $v$       [C]  $p$       [D]  $r$

11. 080011a, P.I. A.S.20

A box contains six black balls and four white balls. What is the probability of selecting a black ball at random from the box?

[A]  $\frac{4}{6}$       [B]  $\frac{6}{4}$       [C]  $\frac{1}{10}$       [D]  $\frac{6}{10}$

12. 080012a, P.I. A.A.27

The solution set for the equation

$x^2 - 2x - 15 = 0$  is

[A]  $\{5, 3\}$       [B]  $\{-5, 3\}$

[C]  $\{-5, -3\}$       [D]  $\{5, -3\}$

13. 080013a, P.I. A.A.10

What is the value of  $y$  in the following system of equations?

$2x + 3y = 6$

$2x + y = -2$

[A] 1      [B] 4      [C] 2      [D] -3

14. 080014a, P.I. G.G.26

What is the converse of the statement "If it is sunny, I will go swimming"?

[A] I will go swimming if and only if it is sunny.

[B] If I go swimming, it is sunny.

[C] If it is not sunny, I will not go swimming.

[D] If I do not go swimming, then it is not sunny.

15. 080015a, P.I. A.A.22

Solve for  $x$ :  $15x - 3(3x + 4) = 6$

[A]  $\frac{1}{3}$       [B]  $-\frac{1}{2}$       [C] 1      [D] 3

16. 080016a, P.I. A.N.3

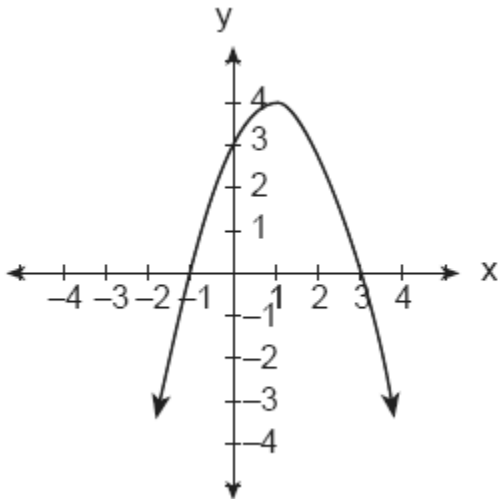
The expression  $2\sqrt{50} - \sqrt{2}$  is equivalent to

[A] 10      [B]  $9\sqrt{2}$

[C]  $2\sqrt{48}$       [D]  $49\sqrt{2}$

17. 080017a, P.I. A.G.4

Which is an equation of the parabola shown in the accompanying diagram?



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

18. 080018a, P.I. G.G.33

If two sides of a triangle are 1 and 3, the third side may be

- [A] 5      [B] 4      [C] 3      [D] 2

19. 080019a, P.I. A.A.6

A girl can ski down a hill five times as fast as she can climb up the same hill. If she can climb up the hill and ski down in a total of 9 minutes, how many minutes does it take her to climb up the hill?

- [A] 4.5      [B] 1.8      [C] 7.5      [D] 7.2

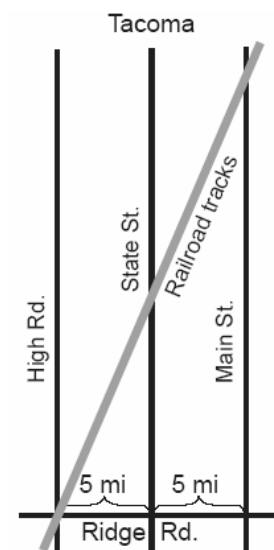
20. 080020a, P.I. A.A.13

When  $3x^2 - 2x + 1$  is subtracted from  $2x^2 + 7x + 5$ , the result will be

- [A]  $-x^2 + 5x + 6$       [B]  $x^2 + 5x + 6$   
 [C]  $x^2 - 9x - 4$       [D]  $-x^2 + 9x + 4$

21. 080021a, P.I. G.G.45

The accompanying diagram shows a section of the city of Tacoma. High Road, State Street, and Main Street are parallel and 5 miles apart. Ridge Road is perpendicular to the three parallel streets. The distance between the intersection of Ridge Road and State Street and where the railroad tracks cross State Street is 12 miles. What is the distance between the intersection of Ridge Road and Main Street and where the railroad tracks cross Main Street?



22. 080022a, P.I. A.A.18

Perform the indicated operation and express

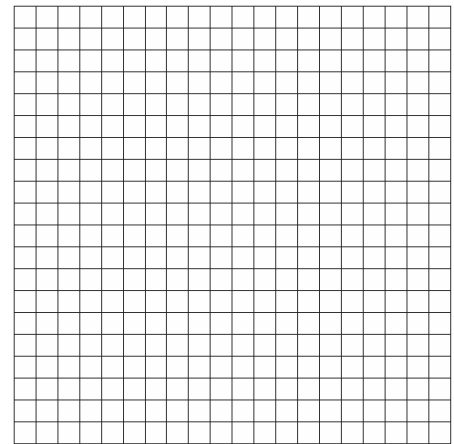
the result in simplest terms:  $\frac{x}{x+3} \div \frac{3x}{x^2-9}$

23. 080023a, P.I. A.G.1

Kerry is planning a rectangular garden that has dimensions of 4 feet by 6 feet. Kerry wants one-half of the garden to have roses, and she says that the rose plot will have dimensions of 2 feet by 3 feet. Is she correct? Explain.

24. 080024a, P.I. A.A.6  
The sum of the ages of the three Romano brothers is 63. If their ages can be represented as consecutive integers, what is the age of the middle brother?
25. 080025a, P.I. A2.S.11  
Alan, Becky, Jesus, and Mariah are four students in the chess club. If two of these students will be selected to represent the school at a national convention, how many combinations of two students are possible?
26. 080026a  
John, Dan, Karen, and Beth went to a costume ball. They chose to go as Anthony and Cleopatra, and Romeo and Juliet. John got the costumes for Romeo and Cleopatra, but not his own costume. Dan saw the costumes for Juliet and himself. Karen went as Anthony. Beth drove two of her friends, who were dressed as Anthony and Cleopatra, to the ball. What costume did John wear?
27. 080027a, P.I. A.G.1  
To measure the length of a hiking trail, a worker uses a device with a 2-foot-diameter wheel that counts the number of revolutions the wheel makes. If the device reads 1,100.5 revolutions at the end of the trail, how many miles long is the trail, to the *nearest tenth of a mile*?

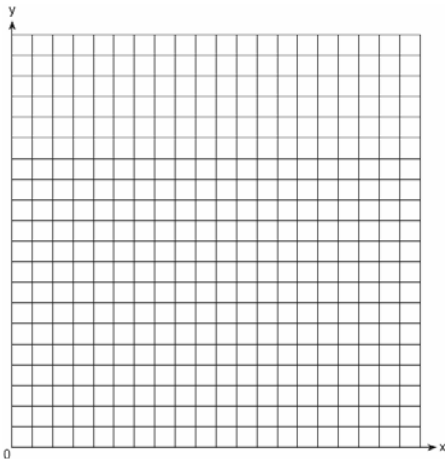
28. 080028a, P.I. G.G.54, G.G.58  
The coordinates of the endpoints of  $\overline{AB}$  are  $A(2,6)$  and  $B(4,2)$ . Is the image  $\overline{A''B''}$  the same if it is reflected in the  $x$ -axis, then dilated by  $\frac{1}{2}$  as the image is if it is dilated by  $\frac{1}{2}$ , then reflected in the  $x$ -axis? Justify your answer.



29. 080029a, P.I. A.N.5  
After an ice storm, the following headlines were reported in the *Glacier County Times*:  
Monday: Ice Storm Devastates County - 8 out of every 10 homes lose electrical power  
Tuesday: Restoration Begins - Power restored to  $\frac{1}{2}$  of affected homes  
Wednesday: More Freezing Rain - Power lost by 20% of homes that had power on Tuesday  
Based on these headlines, what fractional portion of homes in Glacier County had electrical power on Wednesday?
30. 080030a  
Katrina hikes 5 miles north, 7 miles east, and then 3 miles north again. To the *nearest tenth of a mile*, how far, in a straight line, is Katrina from her starting point?

31. 080031a, P.I. A.G.1  
Mr. Santana wants to carpet exactly half of his rectangular living room. He knows that the perimeter of the room is 96 feet and that the length of the room is 6 feet longer than the width. How many square feet of carpeting does Mr. Santana need?

32. 080032a, P.I. G.G.69  
Ashanti is surveying for a new parking lot shaped like a parallelogram. She knows that three of the vertices of parallelogram  $ABCD$  are  $A(0,0)$ ,  $B(5,2)$ , and  $C(6,5)$ . Find the coordinates of point  $D$  and sketch parallelogram  $ABCD$  on the accompanying set of axes. Justify mathematically that the figure you have drawn is a parallelogram.



33. 080033a, P.I. A.A.44  
A 10-foot ladder is to be placed against the side of a building. The base of the ladder must be placed at an angle of  $72^\circ$  with the level ground for a secure footing. Find, to the nearest inch, how far the base of the ladder should be from the side of the building and how far up the side of the building the ladder will reach.

34. 080034a, P.I. A.N.8  
The telephone company has run out of seven-digit telephone numbers for an area code. To fix this problem, the telephone company will introduce a new area code. Find the number of new seven-digit telephone numbers that will be generated for the new area code if both of the following conditions must be met:  
o The first digit cannot be a zero or a one.  
o The first three digits cannot be the emergency number (911) or the number used for information (411).

35. 080035a, P.I. A.A.8  
Jack is building a rectangular dog pen that he wishes to enclose. The width of the pen is 2 yards less than the length. If the area of the dog pen is 15 square yards, how many yards of fencing would he need to completely enclose the pen?

- [1]  C
- [2]  A
- [3]  B
- [4]  B
- [5]  C
- [6]  C
- [7]  D
- [8]  D
- [9]  B
- [10]  B
- [11]  D
- [12]  D
- [13]  B
- [14]  B
- [15]  D
- [16]  B
- [17]  C
- [18]  C
- [19]  C
- [20]  D

[2] 24 miles and appropriate work is shown, such as using a proportion, showing doubling of the sides, or using any other appropriate method.

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

or [1] An incorrect proportion is appropriately solved.

or [1] 24 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

[21]  incorrect procedure.

[2]  $\frac{x-3}{3}$  and multiplication by the reciprocal,

correct factoring, and canceling are shown.

[1] The difference of two squares,

$x^2 - 9 = (x + 3)(x - 3)$ , is factored correctly.

or [1] Appropriate work is shown, but the final answer is incorrect.

or [1]  $\frac{x-3}{3}$  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

[22]  incorrect procedure.

[2] Kerry is incorrect and an explanation is given that the original area is  $24 \text{ ft}^2$  and the area of the rose plot is  $6 \text{ ft}^2$ , which is not half of  $24 \text{ ft}^2$ .

or [2] Kerry is incorrect and an explanation is given that since the original area is  $24 \text{ ft}^2$ , the area of the rose plot should be  $12 \text{ ft}^2$ , so the new dimensions should multiply to 12, such as  $3 \times 4$ ,  $4 \times 3$ ,  $2 \times 6$ ,  $2 \times 6$ .

or [2] Kerry is incorrect and a diagram is used to show the original area is  $24 \text{ ft}^2$  and the area of the rose plot is  $6 \text{ ft}^2$ .

[1] Kerry is incorrect but the work or diagram shows one error.

or [1] Appropriate work is shown, but the incorrect conclusion is found.

[0] Kerry is incorrect or correct but no explanation is given.

or [0] Kerry is correct and  $\frac{1}{2}(4) = 2$  or

$\frac{1}{2}(6) = 3$  is shown.

or [0] Kerry is correct and the student uses the perimeter.

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

[23]  obviously incorrect procedure.

- [2] 21 and the student shows an appropriate solution, such as the equation  $x + x + 1 + x + 2 = 63$  or trial and error.  
[1] Appropriate work is shown, but an incorrect answer is found.  
or [1] An incorrect equation is shown, but it is solved appropriately to find an answer, such as  $x + x + 2 + x + 4 = 63$ .  
or [1] 21 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] 6 and appropriate work is shown, such as using the combination  ${}_4C_2$ , listing all six possible outcomes, or drawing a correct tree diagram.  
[1] A correct setup of combinations is shown, but an incorrect solution, such as leaving  ${}_4C_2$ , or no integral solution is found.  
or [1] An appropriate list or tree diagram is shown, but an incorrect solution is found, such as 5, by omitting one of the possible combinations.  
or [1] 12 but a complete list or tree diagram is shown.  
or [1] 6 but no work is shown.  
[0] The answer is completely incorrect, such as  ${}_4P_2$  or  $4 \times 3$ .  
or [0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [3] Juliet and an explanation is given of how the identification was reached, such as by a narrative or table.  
[2] One error is made in the logic statements or the table, but appropriate results are found.  
[1] More than one error is made in the logic statements or the table, but appropriate work is shown.  
or [1] Juliet 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.
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- [3] 1.3 and appropriate work is shown, such as calculating the circumference of the wheel and the length of the trail in feet, and converting them to miles, such as  $\frac{2 \cdot \pi \cdot 1100.5}{5280}$ .

- [2] The student correctly calculates the circumference and length in feet but does not convert them to miles.  
or [2] Correct calculations are shown, but the answer is rounded incorrectly or is not rounded.  
or [2] Appropriate work is shown, but one error is made.  
[1] The correct circumference is calculated.  
or [1] Appropriate work is shown, but more than one error is made.  
or [1] 1.3 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.
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- [3] Yes,  $A''$  is  $(1,-3)$  and  $B''$  is  $(2,-1)$  and appropriate work is shown, algebraically or graphically.  
[2] Correct coordinates for  $A''$  and  $B''$  are found, but no conclusion is shown.  
or [2] Either  $A''$  or  $B''$  is correct, and an appropriate conclusion is shown.  
or [2] One transformation is correct and one is incorrect, such as the reflection in  $y$ , but an appropriate conclusion is shown.  
[1] Neither transformation is correct, but an appropriate conclusion is shown.  
or [1] One transformation is correct.  
[0] A zero response is completely incorrect, irrelevant, or incoherent or is a correct response that was obtained by an obviously incorrect procedure.
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- [28]
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[3]  $\frac{48}{100}$  or any equivalent fraction or 0.48 or 48% and appropriate work is shown, such as on Monday  $\frac{2}{10}$  have power,  $\frac{8}{10}$  lost power; on Tuesday  $\frac{1}{2}(\frac{8}{10}) = \frac{4}{10}$  have been restored, therefore  $\frac{2}{10} + \frac{4}{10} = \frac{6}{10}$  have power; on

Wednesday  $\frac{2}{10}$  lose power, therefore

$$(\frac{8}{10})(\frac{6}{10}) = \frac{48}{100} \text{ have power.}$$

[2] Appropriate work is shown, but one computational error is made, leading to a fractional answer.

or [2] One error of having or losing power is made, such as taking 20% of  $\frac{4}{10}$ .

[1] Appropriate work is shown, but multiple computational errors are made.

or [1] The correct answer is found, 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

[29] incorrect procedure.

[3] 10.6 and the Pythagorean theorem,  $C^2 = 8^2 + 7^2$ , or any other appropriate method is shown.

[2] Appropriate work is shown, but the answer is left as  $\sqrt{113}$  or is rounded incorrectly.

or [2] Appropriate work is shown, but one computational error is made.

[1] Appropriate work is shown, but multiple errors are made.

or [1] The only correct work shown is a correctly drawn diagram with three distances labeled.

or [1] 10.6 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

[30] incorrect procedure.

[4] 283.5 or 284 and appropriate work or an explanation is shown, such as  $4x + 12 = 96$ ,  $\frac{21 \times 27}{2}$ , or trial and error.

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

[2] Appropriate work is shown, but more than one computational error is made.

or [2] 283.5 or 284 and only a check is shown.

[1] Appropriate work is shown, but no answer is found.

or [1] 283.5 or 284 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

[31] incorrect procedure.

[4] The student draws parallelogram  $ABCD$  correctly, identifies  $D(1,3)$ , and justifies the coordinates of  $D$  by using any appropriate method to show  $ABCD$  is a parallelogram.

[3] The student draws parallelogram  $ABCD$  incorrectly but justifies  $D$  appropriately.

or [3] The student draws parallelogram  $ABCD$  correctly and identifies  $D(1,3)$ , but the justification is incomplete.

[2] The student draws parallelogram  $ABCD$  correctly and identifies  $D(1,3)$ , but no justification is shown.

[1] The student either draws parallelogram  $ABCD$  correctly or identifies  $D(1,3)$  correctly.

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

[32] incorrect procedure.



[4] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) and appropriate work is shown, such as

$$\sin 72^\circ = \frac{x}{10} \text{ and } \cos 72^\circ = \frac{y}{10} \text{ or use of the}$$

Pythagorean theorem.

[3] An incorrect diagram is drawn, but appropriate work and an appropriate solution for that diagram are shown.

or [3] Appropriate work is shown, but the answers are rounded to the nearest foot and then converted to inches, arriving at 120" and 36".

or [3] The setup is correct, but the answers are not converted to the nearest inch.

[2] One correct dimension is shown, such as 114" (9 feet 6 inches) or 37" (3 feet 1 inch).

or [2] Only one error involving interchanging sine and cosine is made.

or [2] An incorrect diagram is drawn, and the solution is appropriate for the diagram but is not rounded to the nearest inch.

[1] The student switches sine and cosine and does not round to the nearest inch.

or [1] The student uses the correct trigonometric function to compute one side correctly but does not convert it to the nearest inch.

or [1] 114" (9 feet 6 inches) and 37" (3 feet 1 inch) 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

[33] incorrect procedure.

[4]  $7.98 \times 10^6$  or 7,980,000 and appropriate work is shown, such as  $8 \times 10^6 - 2 \times 10^4$ .

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

or [3] The student uses 1–9 instead of 0–9 as the number of digits in  $8 \times 9^6 - 2 \times 9^4$ .

[2] The student correctly produces only one part,  $8 \times 10^6$  or  $2 \times 10^4$ , but carries the process to an appropriate result.

or [2] Appropriate work is shown, but more than one error is made.

[1] The student produces only one part,  $8 \times 9^6$  or  $2 \times 9^4$ .

or [1] 7,980,000 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

[34] incorrect procedure.

[4] 16 and appropriate work is shown, such as  $W(W + 2) = 15$ .

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

or [3]  $L = 5$ ,  $W = 3$ , and the perimeter = 16, but no work is shown.

[2] Appropriate work is shown, but more than one computational error is made.

or [2]  $L = 5$ ,  $W = 3$ , and appropriate work is shown, but the perimeter is not found.

or [2] The length and width are incorrect, but the perimeter is computed appropriately.

[1] Length and width are appropriately defined in terms of a single variable.

or [1] 16 but no work is shown.

[0]  $L = 5$  and  $W = 3$  but no work is shown, and the perimeter is not found.

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

[35] obviously incorrect procedure.