

1. 069901a, P.I. A.S.20

A fair coin is thrown in the air four times. If the coin lands with the head up on the first three tosses, what is the probability that the coin will land with the head up on the fourth toss?

- [A]  $\frac{1}{2}$     [B] 0    [C]  $\frac{1}{16}$     [D]  $\frac{1}{8}$

2. 069902a, P.I. G.G.25

The statement "If  $x$  is divisible by 8, then it is divisible by 6" is false if  $x$  equals

- [A] 48    [B] 14    [C] 6    [D] 32

3. 069903a, P.I. G.G.61

What is the image of point  $(2,5)$  under the translation that shifts  $(x,y)$  to  $(x+3, y-2)$ ?

- [A]  $(0,8)$     [B]  $(5,3)$     [C]  $(0,3)$     [D]  $(5,8)$

4. 069904a, P.I. A.A.13

The sum of  $3x^2 + x + 8$  and  $x^2 - 9$  can be expressed as

- [A]  $3x^4 + x - 1$     [B]  $4x^4 + x - 1$   
[C]  $4x^2 + x - 17$     [D]  $4x^2 + x - 1$

5. 069905a, P.I. G.G.33

The direct distance between city  $A$  and city  $B$  is 200 miles. The direct distance between city  $B$  and city  $C$  is 300 miles. Which could be the direct distance between city  $C$  and city  $A$ ?

- [A] 50 miles    [B] 350 miles  
[C] 550 miles    [D] 650 miles

6. 069906a, P.I. A.A.16

Expressed as a single fraction, what is

$$\frac{1}{x+1} + \frac{1}{x}, \quad x \neq 0, -1?$$

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

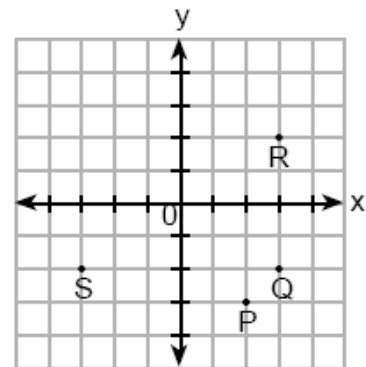
7. 069907a, P.I. A2.S.11

How many different three-member teams can be formed from six students?

- [A] 216    [B] 120    [C] 720    [D] 20

8. 069908a, P.I. G.G.54

If  $x = -3$  and  $y = 2$ , which point on the accompanying graph represents  $(-x, -y)$ ?



- [A]  $Q$     [B]  $P$     [C]  $R$     [D]  $S$

9. 069909a, P.I. A.A.28

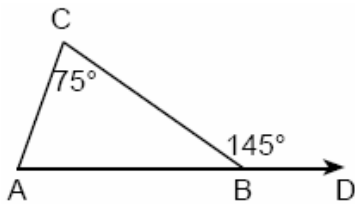
The larger root of the equation  $(x+4)(x-3) = 0$  is

- [A] 4    [B] -3    [C] 3    [D] -4

10. 069910a, P.I. A.N.5  
Linda paid \$48 for a jacket that was on sale for 25% of the original price. What was the original price of the jacket?  
[A] \$72 [B] \$192 [C] \$60 [D] \$96

11. 069911a, P.I. A.A.12  
The expression  $2^3 \cdot 4^2$  is equivalent to  
[A]  $8^6$  [B]  $8^5$  [C]  $2^7$  [D]  $2^{12}$

12. 069912a, P.I. G.G.32  
In the accompanying diagram of  $\triangle ABC$ ,  $\overline{AB}$  is extended to  $D$ , exterior angle  $CBD$  measures  $145^\circ$ , and  $m\angle C = 75^\circ$ .



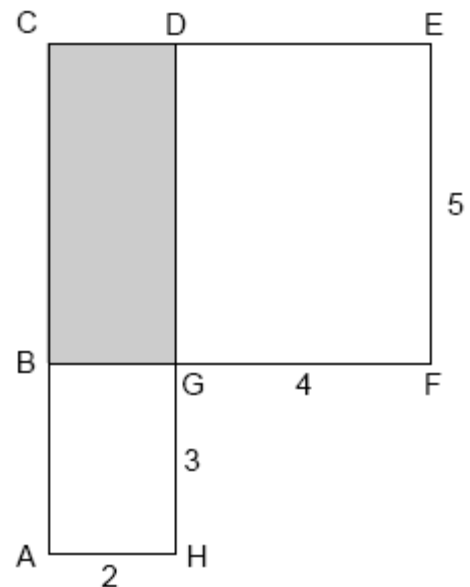
- What is  $m\angle CAB$ ?  
[A] 35 [B] 110 [C] 220 [D] 70

13. 069913a, P.I. A.A.26  
A total of \$450 is divided into equal shares. If Kate receives four shares, Kevin receives three shares, and Anna receives the remaining two shares, how much money did Kevin receive?  
[A] \$100 [B] \$200  
[C] \$250 [D] \$150

14. 069914a, P.I. 7.G.1  
What is the diameter of a circle whose circumference is 5?  
[A]  $\frac{5}{\pi}$  [B]  $\frac{2.5}{\pi}$  [C]  $\frac{5}{\pi^2}$  [D]  $\frac{2.5}{\pi^2}$

15. 069915a, P.I. A.A.26  
During a recent winter, the ratio of deer to foxes was 7 to 3 in one county of New York State. If there were 210 foxes in the county, what was the number of deer in the county?  
[A] 490 [B] 147 [C] 90 [D] 280

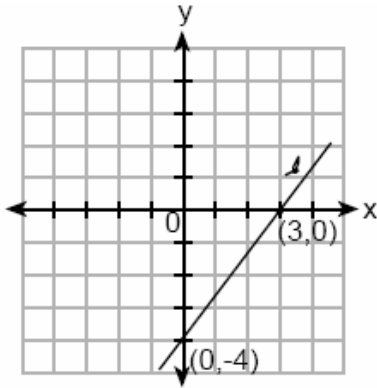
16. 069916a, P.I. A.G.1  
In the accompanying figure,  $ACDH$  and  $BCEF$  are rectangles,  $AH = 2$ ,  $GH = 3$ ,  $GF = 4$ , and  $FE = 5$ .



- What is the area of  $BCDG$ ?  
[A] 10 [B] 20 [C] 8 [D] 6

17. 069917a, P.I. 7.N.3  
If  $t^2 < t < \sqrt{t}$ , then  $t$  could be  
[A]  $-\frac{1}{4}$  [B]  $\frac{1}{4}$  [C] 0 [D] 4

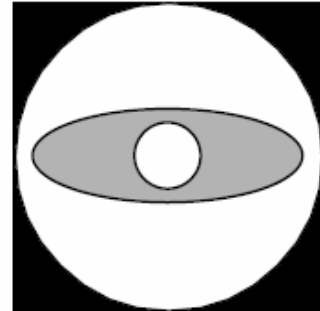
18. 069918a, P.I. 8.G.13  
What is the slope of line  $\ell$  shown in the accompanying diagram?



- [A]  $-\frac{4}{3}$     [B]  $-\frac{3}{4}$     [C]  $\frac{4}{3}$     [D]  $\frac{3}{4}$
19. 069919a, P.I. A.RP.11  
In a class of 50 students, 18 take music, 26 take art, and 2 take both art and music. How many students in the class are not enrolled in either music or art?
- [A] 16    [B] 24    [C] 8    [D] 6

20. 069920a, P.I. A.N.3  
The expression  $\sqrt{27} + \sqrt{12}$  is equivalent to
- [A]  $5\sqrt{6}$                       [B]  $\sqrt{39}$   
[C]  $5\sqrt{3}$                         [D]  $13\sqrt{3}$

21. 069921a  
Draw all the symmetry lines on the accompanying figure.



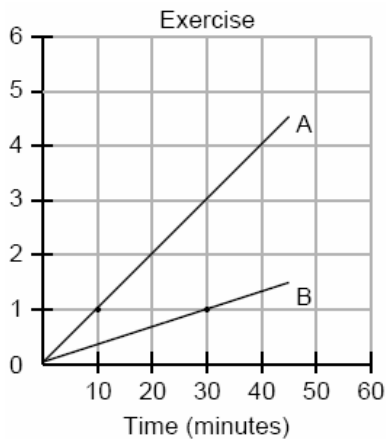
22. 069922a, P.I. A.A.23  
Shoe sizes and foot length are related by the formula  $S = 3F - 24$ , where  $S$  represents the shoe size and  $F$  represents the length of the foot, in inches.
- a Solve the formula for  $F$ .  
b To the *nearest tenth of an inch*, how long is the foot of a person who wears a size  $10\frac{1}{2}$  shoe?

23. 069923a, P.I. 7.N.2  
Which number below is irrational?
- $\sqrt{\frac{4}{9}}$ ,  $\sqrt{20}$ ,  $\sqrt{121}$
- Why is the number you chose an irrational number?

24. 069924a, P.I. A.A.16  
Simplify:  $\frac{9x^2 - 15xy}{9x^2 - 25y^2}$

25. 069925a, P.I. A.A.6  
Sara's telephone service costs \$21 per month plus \$0.25 for each local call, and long-distance calls are extra. Last month, Sara's bill was \$36.64, and it included \$6.14 in long-distance charges. How many local calls did she make?

26. 069926a, P.I. 8.G.13  
During a 45-minute lunch period, Albert (A) went running and Bill (B) walked for exercise. Their times and distances are shown in the accompanying graph. How much faster was Albert running than Bill was walking, in miles per hour?

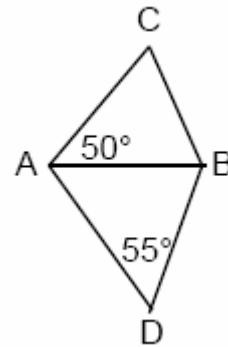


27. 069927a  
The dimensions of a brick, in inches, are 2 by 4 by 8. How many such bricks are needed to have a total volume of exactly 1 cubic foot?

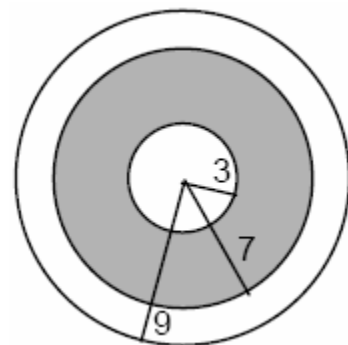
28. 069928a, P.I. A.A.6  
A swimmer plans to swim at least 100 laps during a 6-day period. During this period, the swimmer will increase the number of laps completed each day by one lap. What is the *least* number of laps the swimmer must complete on the first day?

29. 069929a, P.I. A.A.6  
The mean (average) weight of three dogs is 38 pounds. One of the dogs, Sparky, weighs 46 pounds. The other two dogs, Eddie and Sandy, have the same weight. Find Eddie's weight.

30. 069930a, P.I. G.G.31  
In the accompanying diagram,  $\triangle ABC$  and  $\triangle ABD$  are isosceles triangles with  $m\angle CAB = 50$  and  $m\angle BDA = 55$ . If  $AB=AC$  and  $AB=BD$ , what is  $m\angle CBD$ ?



31. 069931a, P.I. A.G.1  
A target shown in the accompanying diagram consists of three circles with the same center. The radii of the circles have lengths of 3 inches, 7 inches, and 9 inches.



- a What is the area of the shaded region to the *nearest tenth of a square inch*?
- b To the *nearest percent*, what percent of the target is shaded?

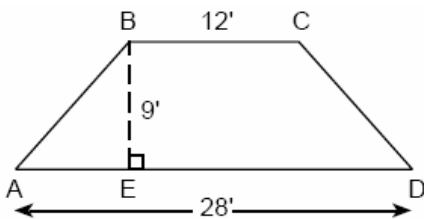
32. 069932a, P.I. A2.S.12

A bookshelf contains six mysteries and three biographies. Two books are selected at random without replacement.

- a What is the probability that both books are mysteries?
- b What is the probability that one book is a mystery and the other is a biography?

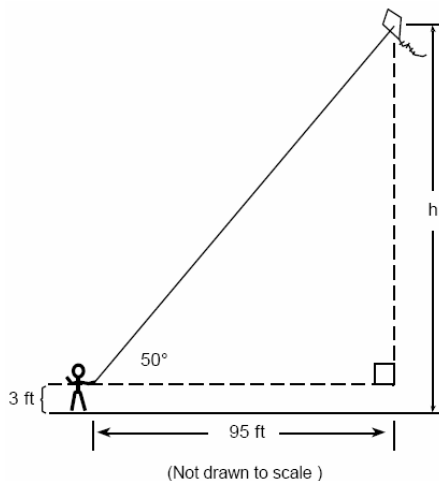
33. 069933a, P.I. G.G.40

The cross section of an attic is in the shape of an isosceles trapezoid, as shown in the accompanying figure. If the height of the attic is 9 feet,  $BC = 12$  feet, and  $AD = 28$  feet, find the length of  $\overline{AB}$  to the nearest foot.



34. 069934a, P.I. A.A.44

Joe is holding his kite string 3 feet above the ground, as shown in the accompanying diagram. The distance between his hand and a point directly under the kite is 95 feet. If the angle of elevation to the kite is  $50^\circ$ , find the height,  $h$ , of his kite, to the nearest foot.

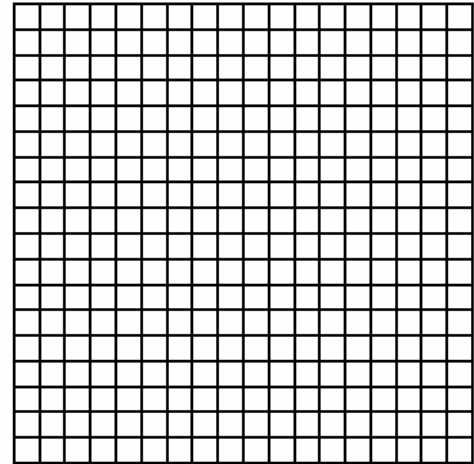


35. 069935a, P.I. A.A.11

Solve the following system of equations algebraically or graphically for  $x$  and  $y$ :

$$y = x^2 + 2x - 1$$

$$y = 3x + 5$$



[1] A

[2] D

[3] B

[4] D

[5] B

[6] D

[7] D

[8] A

[9] C

[10] B

[11] C

[12] D

[13] D

[14] A

[15] A

[16] A

[17] B

[18] C

[19] C

[20] C

[2] Both correct lines of symmetry are drawn:  
one horizontal, one vertical.

[1] Only one correct line is drawn.

or [1] Two correct and one or two incorrect  
lines, such as the diagonals, are drawn.

[0] More than two incorrect lines are drawn.

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

[21] obviously incorrect procedure.

a [1]  $\frac{S+24}{3}$  or  $\frac{S}{3}+8$

b [1] 11.5

or [1] Correct substitution into an incorrect  
part a is shown, and the answer is given to the  
nearest tenth of an inch.

a and b

[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]  $\sqrt{20}$  and an appropriate explanation is  
given, such as the number cannot be written  
as a repeating or terminating decimal or it  
cannot be written as a fraction or it is not a  
perfect square.

[1]  $\sqrt{20}$  and an inappropriate explanation or  
no explanation is given.

or [1]  $\sqrt{20}$  and a correct explanation is given,  
but one other number is also identified as  
irrational.

[0] All three numbers are identified as  
irrational.

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]  $\frac{3x}{3x+5y}$

[1] One correct factoring is shown, either  
 $3x(3x-5y)$  or  $(3x-5y)(3x+5y)$ .

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

[24] incorrect procedure.

[2] 38 and an appropriate method is shown, such as  $36.64 - (21 + 6.14) = 9.50$  and  $\frac{9.50}{.25} = 38$  or an equation such as  $21 + .25c + 6.14 = 36.64$ .

[1] 38 and no work is shown.

or [1] An appropriate method or equation is shown, but one computational mistake is made.

or [1] The answer of \$9.50 for local calls is found but is not divided by .25.

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

[25] incorrect procedure.

[3] 4 and an appropriate method is shown, such as calculating A at 6 mph and B at 2 mph through arithmetic, formula, or extending the graph to 60 minutes.

[2] The speeds of 6 and 2 are found but not their difference.

or [2] Their difference is found but not in miles per hour.

[1] Only distances of 4.5 miles and 1.5 miles are found.

or [1] The speeds found are incorrect but then are subtracted appropriately.

or [1] 3 times as fast and no appropriate explanation is given.

or [1] 4 and no appropriate explanation is given.

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

[26] incorrect procedure.

[3] 27 and an appropriate method or explanation is shown, such as

$(\frac{1}{6})(\frac{1}{3})(\frac{2}{3}) = \frac{1}{27}$  of a cubic foot, thus 27

bricks needed or, in inches,  $\frac{1728}{64} = 27$ . A

labeled drawing is an acceptable explanation.

[2] An appropriate method for finding volume is shown, but one computational mistake is made.

[1] Correct conversion into feet is shown.

or [1] The volume of 64 cubic inches is found.

or [1] 27 and no explanation is given.

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

[27] incorrect procedure.

[3] 15 and an appropriate method or explanation is shown, such as trial and error or the inequality  $6x + 15 \geq 100$ .

[2] An appropriate method is shown, but it stops at 14.

[1] An appropriate method is shown, but no answer is found.

or [1] 15 and no explanation is given.

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

[28] incorrect procedure.

[3] 34 and an appropriate explanation is given, such as  $38 = \frac{46 + 2x}{3}$ .

[2] An appropriate method or equation is shown, but one computational mistake is made.

or [2] The student does not take into consideration two dogs of equal weight and gives an answer of 68.

[1] The student understands weighted average in that three dogs averaging 38 pounds must have a total weight of 114 pounds but does not subtract the known weight.

or [1] 34 and no explanation is given.

[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] 135 and appropriate work is shown.

[2] The two correct angles of  $65^\circ$  and  $70^\circ$  are found, but their sum is not identified as the answer to the question.

or [2]  $65^\circ$  or  $70^\circ$  and an appropriate sum is found.

[1] Either the  $65^\circ$  or the  $70^\circ$  is correctly identified.

or [1] Two incorrect angle measures are found, but they are added correctly.

or [1] 135 and 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.

a [2] 125.6 or 125.7 (correct for the value of  $\pi$  used) and appropriate work is shown.

[1] The area is left as  $40\pi$  or the answer is not rounded correctly.

or [1] An appropriate method is shown, but one computational mistake is made.

or [1] The correct areas of both circles are found, but the two areas are not subtracted.

or [1] The circumference formula is used correctly for both circles and the circumferences are subtracted for an answer of 25.1.

or [1] 125.6 or 125.7 and no work is shown.

b [2] 49 and an appropriate explanation is given.

or [2] An appropriate percent for an incorrect part a is found and supported by area formulas.

[1] The answer is left as  $\frac{40\pi}{81\pi}$ .

or [1] An appropriate fraction for an incorrect part a is found but not given as a percent.

or [1] An appropriate percent for an incorrect part a is found and is supported by circumference formulas.

or [1] 49 and no work is shown.

[0]  $\frac{4}{9}$  or 44% and no work is shown.

or [0] 4 is found by subtracting the radii.

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

[31] obviously incorrect procedure.



$a$  [2]  $\frac{30}{72}$  or an equivalent value is found and

an appropriate explanation is given.

[1] An acceptable method is used correctly, such as a tree diagram, sample space, or combinations, but the correct answer is not given.

or [1] Replacement is used, and an answer of  $\frac{36}{81}$  or an equivalent is found.

or [1]  $\frac{30}{72}$  and no work is shown.

$b$  [2]  $\frac{36}{72}$  or an equivalent value is found and

an appropriate explanation is given.

or [2] An appropriate probability for an incorrect denominator for part  $a$  is found.

[1] An appropriate method is shown, but one computational mistake is made.

or [1] Replacement is shown, and the answer  $\frac{36}{81}$  or an equivalent is found.

or [1] The student does not take into account both orders and answers  $\frac{18}{72}$  or an equivalent.

or [1]  $\frac{36}{72}$  and no work is shown.

or  $a$  and  $b$

[1] An error in method is made but the erroneous answer is interpreted correctly in either part  $a$  or  $b$  or both.

[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] 12 and an appropriate method is shown, such as  $(AB)^2 = 9^2 + 8^2$ .

[3] An incorrect length is found for AE, but then it is used to correctly complete the problem.

or [3] An appropriate method is shown, but one computational mistake is made.

or [3] An appropriate method is shown, but the answer is not given to the nearest foot, such as  $\sqrt{145}$ .

[2] AE = 8 and one computational mistake is made using the Pythagorean theorem.

or [2] An incorrect length is found for AE, but then it is used to complete the problem correctly, but the answer is not rounded.

[1] AE = 8 is found, but the Pythagorean theorem is not used.

or [1] 12 and 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] 116 and an appropriate method is shown.

[3] An appropriate method is shown, but the answer is left in an inappropriate form, such as 116.2.

or [3] An appropriate method is shown, but 3 feet is not added, and the answer is left 113.

or [3] Tangent function is used, but computational mistakes are made, but 3 feet is added to the incorrect value and the answer is found correctly.

[2] An incorrect trigonometric function is used, 3 feet is added, and the answer is rounded correctly.

or [2] Tangent function is used, but computational mistakes are made, and 3 feet is not added to an incorrect answer.

[1] 116 and no work is shown.

or [1] An incorrect trigonometric function is used, and 3 feet is added to the incorrect answer, but the answer is rounded incorrectly.

[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] (3,14) and  $(-2,-1)$  and either an algebraic or a graphic solution is shown.

[3] An appropriate method is shown, but only one correct ordered pair is identified.

or [3] An appropriate method is shown, but one computational mistake is made.

or [3] An appropriate method is shown, but values are given only for  $x$ .

[2] The substitution is correct, but the quadratic produced is not factored correctly.

or [2] Both equations are graphed correctly, but neither ordered pair is identified.

[1] Only one equation is graphed correctly.

or [1] The substitution is incorrect, but it produces a linear equation that is solved correctly.

or [1] Only the substitution is correct.

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

[35] incorrect procedure.