

Franklin Math Bowl 2009
Answer Keys

6th Grade	7th Grade	8th Grade	Algebra I
1. C	1. C	1. D	1. E
2. D	2. A	2. B	2. D
3. D	3. D	3. C	3. B
4. A	4. A	4. A	4. E
5. C	5. D	5. E	5. A
6. B	6. B	6. D	6. B
7. D	7. A	7. B	7. D
8. D	8. B	8. D	8. D
9. C	9. A	9. D	9. C
10. C	10. A	10. A	10. D
11. A	11. B	11. B	11. D
12. B	12. D	12. A	12. A
13. A	13. D	13. D	13. E
14. B	14. B	14. A	14. D
15. C	15. C	15. C	15. B
16. B	16. B	16. B	16. B
17. D	17. B	17. C	17. A
18. B	18. B	18. B	18. C
19. D	19. C	19. E	19. B
20. D	20. A	20. B	20. A
21. B	21. B	21. D	21. D
22. C	22. D	22. A	22. B
23. A	23. D	23. D	23. C
24. C	24. C	24. B	24. D
25. B	25. D	25. C	25. D

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Problem Solving Answer Keys

Sixth Grade

1. Assume that the radii of the 3 circles are r , $2r$, and $4r$. This will make the ratio of the areas 1:4:16 and the ratio of the circumferences 1:2:4
2. By the Pythagorean Theorem the hypotenuse of the triangle is square root of 106. This means that the square has an area of 106 square inches and the triangle has an area of 22.5 square inches. Therefore the pentagon has an area of 128.5 square inches.
3. The sides can be 3, 4, and 5. This gives a right triangle with area of 6 square units.

Seventh Grade

1. Substitution gives an answer of 54.
2. The area of the smallest band is π and the area of the second largest band is $9\pi - 4\pi$ or 5π . These two bands have an area of 6π . The entire board has an area of 16π , so the ratio is $6\pi/16\pi$ or $3/8$. So the probability of hitting one of these bands if one hits the target is $3/8$.
3. The circumference of a circle is 2π times radius. The semicircular arc has length 5π . The diameter of the circle is 10, so each side of the triangle is also 10. The perimeter is $20 + 5\pi$.

Eighth Grade

1. Assume that the smallest square has side of length x . This means that the next square has sides of length $2x$. These together make the value of the altitude $3x$ so the length of the square is $5x = 20$. $x=4$ and $h = 12$.
2. 540 can be factored as 3 cubed times 2 squared times 5. To get the smallest perfect cube multiply by 2 times 5 squared or 50.
3. If x is less than -4 , then the equation becomes $-x-x-4=5$ or $x = -9/2$. If x is between -4 and 0 , the equation becomes $x-x-4=5$ IMPOSSIBLE. If x is greater than 0 , the equation becomes $x+x+4=5$ and $x = 1/2$.

Algebra

1. If $\frac{x+3y}{x-3y} = \frac{5}{3}$, then $3x+9y = 5x-15y$ and $x=12y$. Therefore
$$\frac{2x+3y}{2x-3y} = \frac{2(12y)+3y}{2(12y)-3y} = \frac{27y}{21y} = \frac{27}{21} = \frac{9}{7}$$
2. The quadratic will factor as $(x+r)(x+s)$ which is $x^2 + (r+s)x + rs$. Which means that $rs = 30$. The options for r and s are 1,30; 2,15; 3,10; and 5,6. So 31, 17, 13, 11, -31, -17, -13, or -11.
3. By long division the fraction can be rewritten as $5 + 58/(n-7)$. This can be an integer only if $(n-7)$ divides 58. This happens only if $(n-7)$ is 1 or 2 or 29 or 58. Therefore $n=8$ or $n=9$ or $n=36$ or $n=65$.