

2008 Rocket City Junior Math Mania Individual Test – 8th Grade

1. What is the sum of the number of months in a year, the number of sides on a heptagon, and the number of faces on a cube?
2. If Abigail is currently five times as old as Vivian, and in nine years she will only be twice as old as Vivian, how old is Abigail now?
3. What are the coordinates, in the form (x, y) , of the point of reflection of the point $(-4, 1)$ across the line $x = -9$?
4. Evaluate: $34^2 - 23^2$
5. What is the surface area, in square centimeters, of a cube with edges measuring 4 cm?
6. 32 is what percent of 20?
7. When the digits of a positive two-digit integer are reversed, the new positive two-digit integer is 27 less than the original. What is the smallest possible value of the original number?
8. A triangle with sides measuring 5, 6, and 8 cm is similar to a triangle with sides measuring 3, 4, and x cm. What is the value of x ?
9. When two fair, six-sided dice are rolled, what is the probability that the sum of the numbers shown is eleven?
10. What is the volume, in cubic centimeters, of a right circular cone with a base radius of 5 cm and a height of 6 cm?
11. Two concentric circles have radii of 8 and 12 cm. What is the length, in centimeters, of a chord of the larger circle that is tangent to the smaller circle?
12. What is the area, in square centimeters, of a triangle with sides measuring 25, 40, and 25 cm?
13. What is the equation, in slope-intercept form $(y = mx + b)$, of the line through the point $(-2, -6)$ and perpendicular to the line $3x + 6y = 2$?
14. What is the fifth term of an arithmetic sequence with a first term of 14 and a common difference of 9?
15. When Ella, Fred, Greg, and Hannah stand in line, Hannah is not first, Greg is directly ahead of Fred, and Ella is somewhere behind Hannah. Write the first letters of the people in line from front to back (e.g. EFGH) as your answer.
16. Express in simplest radical form: $\sqrt{96}$

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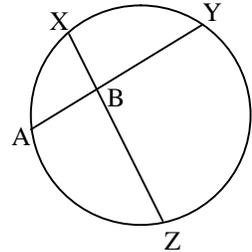
17. If 10 liters of a 40% alcohol solution are mixed with 25 liters of a 5% alcohol solution, what percentage of the resulting mixture will be alcohol?

18. What value(s) of q satisfy $q^2 + 4q - 9 = 0$?

19. If $c(d) = 3d - 4$ and $e(f) = 2f + 3$, determine $e(c(5))$.

20. What is the mean of the data set $\{1, 3, 6, 10, 65\}$?

21. In the circle shown, $m\angle XY = 25^\circ$, $m\angle YZ = 72^\circ$, and $m\angle ZA = 94^\circ$. What is the measure, in degrees, of $\angle XBA$?



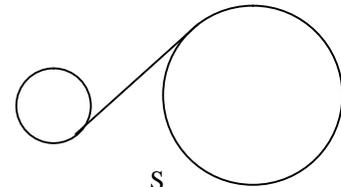
22. If Tanya can vacuum the living room in seven hours and her brother Umberto can do so in five hours, how many **minutes** would it take the two of them working together (assume they each have their own vacuum)?

23. Simplify completely: $\frac{(3p^2 + 6p - 4) - (p^2 + 7p - 1)}{p + 1}$

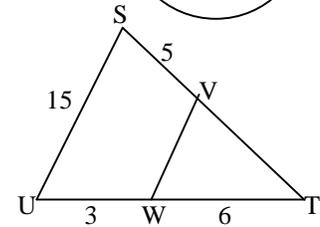
24. What is the product of the roots of $2g^2 - g + 3 = 0$?

25. What is the sum of the terms of an infinite geometric sequence with a first term of 24 and a common ratio of $\frac{1}{4}$?

26. Two circles with radii of 36 and 12 cm have their centers 60 cm apart. What is the length, in centimeters, of their common internal tangent?



27. In $\triangle STU$ shown, where $\overline{VW} \parallel \overline{SU}$, what is the length of \overline{VT} ?



28. What is the equation of the axis of symmetry of the parabola with equation $y = x^2 - 8x + 3$?

29. How many real roots does the equation $3x^2 + 2x + 1 = 0$ have?

30. If A is the set of positive multiples of 5 less than 100 and B is the set of positive multiples of 3 greater than 20, how many elements are there in the set $A \cap B$?