

2007 Rocket City Junior Math Mania
Algebra Test – 7th Grade

1. If I drive 80 km at 20 kmph and then 60 km at 30 kmph, how fast must I drive the remaining 40 km, in kilometers per hour, to average 22.5 kmph for the entire trip?

2. What is the distance between the points $(3, 4)$ and $(15, -5)$?

3. Evaluate: $(9 - 6 \div 2)^2 + 8 \div 4$

47

4. Evaluate: 86

+29

5. What is the equation, in slope-intercept form ($y = mx + b$), of the line through the points $(1, 5)$ and $(-1, 9)$?

$$v + w + x = -2$$

6. What is the value of v in the solution to the system of equations $2v - w - x = 5$?

$$v + 2w + 3x = -6$$

7. Express $\sqrt{1080}$ in simplest radical form.

8. If you can buy 6 liters of root beer for D dollars, how many liters of root beer can you buy for 60 cents? Express your answer as a fraction in terms of D .

9. t is a positive two-digit integer. u is the positive two-digit integer formed when the digits of t are reversed. If u is two more than twice t , what is the largest possible value of t ?

10. What value(s) of y satisfy $5y + 12 = 2y^2$?

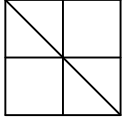
2007 Rocket City Junior Math Mania
Geometry Test – 7th Grade

1. What is the largest number of regions into which five lines can divide a plane?
2. A right triangle has a hypotenuse measuring 26 cm and a leg measuring 10 cm. What is the length of the other leg, in centimeters?
3. What is the area, in square centimeters, of a circle circumscribed about an equilateral triangle with sides measuring 6 cm?
4. A rectangle has an area of 308 cm^2 and a perimeter of 72 cm. What is the length, in centimeters, of a longer side of the rectangle?
5. What is the surface area, in square centimeters, of a regular tetrahedron with edges measuring 7 cm?
6. What is the sum, in degrees, of the measures of the interior angles in a convex hexagon?
7. What is the volume, in cubic centimeters, of a right circular cone with a base radius of 8 cm and a height of 12 cm?
8. A right triangle has legs measuring 3 and 4 cm. What is the length, in centimeters, of the altitude to the hypotenuse?
9. What is the perimeter, in centimeters, of a square inscribed inside a circle with a radius measuring 8 cm?
10. A cow is tied to an external corner of a rectangular barn measuring 20 by 25 m. If the cow's leash is 30 m long, how many square meters can the cow graze?

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Potpourri Test – 7th Grade

1. If $A = \{2, 4, 6, 8, 10\}$ and $B = \{2, 3, 4, 5, 6\}$, what is $A \cap B$?
2. Express the base eight number 1234_8 as a base ten number.
3. A collection of 23 coins (each of which is either a quarter or a dime) is worth \$4.55. How many quarters are in the collection?
4. What is the perimeter, in centimeters, of a rectangle with an area of 128 cm^2 and a side measuring 8 cm?
5. When three standard six-sided dice are rolled, what is the probability that the numbers shown on their top faces sum to six?
6. How many positive integers are factors of 36? (Both 1 and 36 count as factors of 36.)
7. In the cryptarithm shown, each instance of a letter represents the same digit (0-9) and different letters represent different digits (i.e. if one A is a 1, all A's are 1's and B cannot be
$$\begin{array}{r} AB \\ +BC \\ \hline DA \end{array}$$
1). What is the maximum possible value of the four-digit number ABCD?
8. What is the sum of the terms of an infinite geometric sequence with a first term of 12 and a common ratio of $\frac{1}{3}$?
9. How many positive four-digit integers are divisible by 3 but not 4?
10. In a five-element data set of integers between 0 and 100 inclusive, the mean is 72, the only mode is 63, and the range is 24. What is the largest possible value of the median?

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Probability Test – 7th Grade

1. Two otherwise standard six-sided dice each have an asterisk instead of a six. The asterisk acts as a wildcard, so that two dice match if they show the same number or at least one shows an asterisk. When the two dice are rolled, what is the probability that the two dice match?
2. A trusted friend flips two coins and tells you that she didn't get two heads. What is the probability that she didn't get two tails?
3. What is the probability that a card drawn from a standard 52-card deck is a spade or a nine (or both)?
4. A bag contains three yellow marbles, two blue marbles, and one green marble. If one marble is removed from the bag and hidden, what is the probability that the next marble drawn is blue?
5. How many ways can an ant crawl from the upper left corner of the figure to the lower right corner if it must always travel either down, right, or both along the lines?
6. How many distinct arrangements are there of the letters in the word "PEPPER"?
7. A bag contains three red marbles, four white marbles, and five blue marbles. When two marbles are drawn simultaneously, what is the probability that they are different colors?
8. When three cards are drawn from a standard 52-card deck, what is the probability that they have adjacent ranks (A-2-3, 2-3-4, ..., J-Q-K, or Q-K-A)?
9. When six coins are flipped, what is the probability that there are more heads than tails?
10. The probability of wind today is $\frac{3}{5}$, while the probability of rain is $\frac{2}{3}$. Furthermore, if it rains, the probability of wind rises to $\frac{3}{4}$. What is the probability of neither rain nor wind?