

2003 Mount Rainier Math Invitational
Fifth Grade Individual Test
Written by Jon Hughes and Sol DeLeon

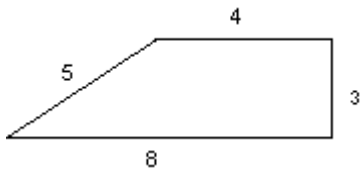
Reduce all fractions and answers should be left in terms of π .

Questions 1-20 are worth 2 points each

- 1) How many 8 cent stamps are in a dozen?
- 2) What is the next prime number after 47?
- 3) Which is larger 2^3 or 3^2 ?
- 4) If the lengths of two sides of an equilateral triangle are both four, what is the length of the third side?
- 5) Convert 0.4 to a fraction (in lowest terms).
- 6) What is the probability of drawing an ace in a standard 52-card deck?
- 7) What is $2 + 3 \times 4$?
- 8) A fish tank has dimensions of 5 feet, 6 feet and 18 inches. How much water does the tank hold if it is $\frac{2}{3}$ full? (answer in cubic feet)
- 9) What is the least common multiple of 20 and 30?
- 10) Elise rolls a standard six-sided die. If the number is even, Elise wins. What is the probability that if Elise plays the game twice she would lose both times?
- 11) A recipe calls for 4 eggs and 5 cups of water. If you only have 3 eggs, how many cups of water should you use? (answer as a mixed fraction)
- 12) What is 98% of 23, divided by 23% of 98?

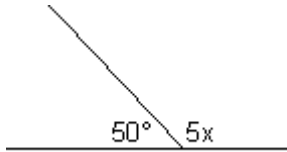
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13) Three 3, 4, 5 right triangles are glued together to form the follow figure.



What is the area of the figure?

14) In the figure below, what is the value of x ?



15) What is 2^5 divided by 2^3 ?

16) Emilo got three perfect scores of 100 his math class. On Emilo's fourth test he was so tired from trying to finish his history paper at 4:00 in the morning that he fell asleep during the math test and got a zero. What was Emilo's average score on his math tests after the fourth test?

17) How many of the first six-hundred positive integers contain the digit 8?

18) What is the least positive integer x for which $18x$ is the cube of an integer?

19) A bottle of toothpaste cost \$2.40 after a 20% reduction. How much did the toothpaste cost before the reduction?

20) If $x = 8 + y$ and $x = 6 - 2y$, what is the value of y ?

Questions 21-30 are worth 3 points each

21) A circle with diameter 16 is cut into thirds. What is the area of one of these thirds?

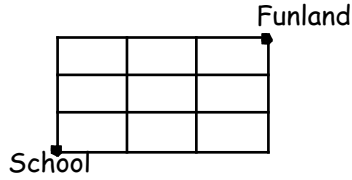
22) What is the perimeter of one of these thirds? (include the arc)

23) Four students take a 60 question team test. The first person takes the first half of the problems, the second takes $\frac{1}{3}$ of the remaining problem, and the third takes $\frac{1}{4}$ of the problem not already taken. What percentage of the entire test does the fourth person take if the team hopes to finish all of the problems?

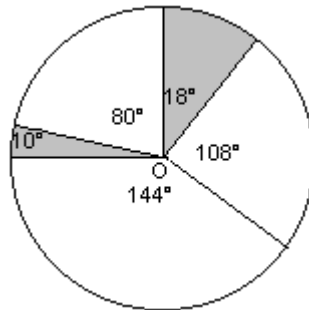
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24) Elizabeth was born on Monday August 5, 1985, what day of the week will her second birthday be on?

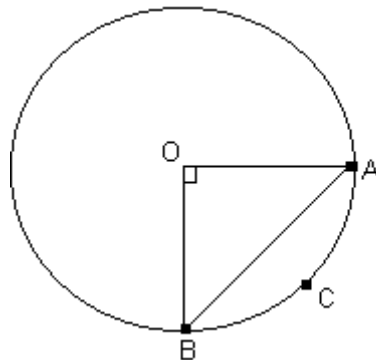
25) On the planet Grid, Ezekiel lives on one corner and Funland is on another. How many ways can Ezekiel go from his school to Funland if he only travels north and east?



26) Given that the radius of the circle is 7, what is the area of the region that is not shaded? (Note that O is the center of the circle)



27) The circle in the figure has center O . Which of the following measures for the figure would be sufficient, independent of the other measurements, to find the radius of the circle? (give all correct answers)



- I. The length of arc ACB
- II. The length of arc CB
- III. The length of chord AB
- IV. The angles of triangle AOB

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28) If one pipe fills a certain pool in 3 hours and another pipe drains the pool in 6 hours, how many hours will it take to fill the empty pool if both pipes are left on?

29) If a roadrunner goes 20 feet in one second, how many miles per hour is the roadrunner going? (There are 5,280 feet in one mile)

30) If a woodchuck could chuck wood, then in two days 3 woodchucks would chuck 15 wood. In ten days, how much wood could 4 woodchucks chuck, if these woodchucks could chuck wood?

5th Grade Individual Test MRMI 2003

Answers

- 1) 12
- 2) 53
- 3) 3^2
- 4) 4
- 5) $\frac{2}{5}$
- 6) $\frac{1}{13}$
- 7) 14
- 8) 30 [feet³]
- 9) 60
- 10) $\frac{1}{4}$
- 11) $3 \frac{3}{4}$
- 12) 1
- 13) 18
- 14) 26
- 15) 4
- 16) 75
- 17) 114
- 18) 12
- 19) \$3.00
- 20) $-\frac{2}{3}$
- 21) $\frac{64\pi}{3}$
- 22) $16 \frac{\pi}{3} + 16$
- 23) 25%
- 24) Wednesday
- 25) 20
- 26) $\frac{4067\pi}{90}$
- 27) I, III
- 28) 6 hours
- 29) 150/11 mph
- 30) 100 wood

From Jon Hughes and Sol DeLeon

2003 Mount Rainier Math Invitational
Fifth Grade Team Who Wants to be a Mathematician
Written by Ryan Mak

Any wrong answer and you will lose any points past the last "safe zone" (after questions 4 and 8). You may use up to two lifelines by putting "LL" as the answer for a question. There is no credit for that question but it does not count as a wrong answer.

Questions 1 - 4 are worth 1 point each

1. True or False, the fraction $\frac{3}{6}$ reduced to lowest terms is $\frac{1}{2}$?
(A) True (B) False (C) Large Animal (D) 5
2. What is the only even Prime Number?
(A) 2 (B) 100 (C) 6 (D) 10021
3. What is the area of a triangle if the base is 6 and the height is 3?
(A) 9 (B) 6 (C) 3 (D) too much work
4. How many more sides does a rectangle have than a quadrilateral?
(A) 0 (B) 2 (C) 4 (D) 1

Questions 5 - 8 are worth 2 points each

5. What is the sum of the measures of the angles in a rectangle minus the sum of the measures of the angles in a triangle?
(A) 140° (B) 180° (C) 360° (D) 540°
6. How many factors (numbers that divide into a number evenly) does the number 102 have not including itself or one?
(A) 2 (B) 4 (C) 103 (D) 6
7. What is the twenty-fifth number in the sequence 1, 2, 3, 4, 6, 7, 8, 9, 11, 12, 13, 14...?
(A) 25 (B) 29 (C) 26 (D) 31
8. Eric and Jon got bored, so they flipped a fair coin 4 times. What is the probability that at least three of the flips will show heads?
(A) $\frac{3}{16}$ (B) $\frac{1}{4}$ (C) $\frac{5}{16}$ (D) $\frac{6}{16}$

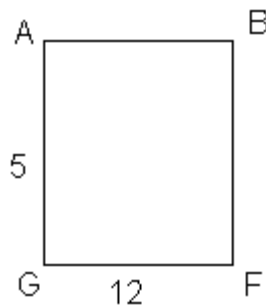
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Questions 9 - 11 are worth 3 points each

9. What will the units digit (the ones digit) be of the product of $6 \cdot 8 \cdot 9 \cdot 7 \cdot 4 \cdot 12 \cdot 9 \cdot 3 \cdot 2 \cdot 4 \cdot 13 \cdot 46 \cdot 18 \cdot 23 \cdot 5$?
(A) 5 (B) 2 (C) 1 (D) 0
10. Solve for $z > 0$ in the equation: $z^2 = (23+2 \cdot 5-50+26) \cdot 9$?
(A) 909 (B) 81 (C) 9 (D) 30.15
11. 200 Snucks equal 50 Portipoises. 9 Smatts equal 12 Portipoises. 15 Krustys equal 67 Portipoises. 59 Krustys equal 40 nannas. 4 Soifsonges equal 90 Shinutaes. 9 Smatts equal 12 Portipoises. 20 Snucks equal 5 Portipoises. 5 Krustys equal 24 Portipoises. 18 Smatts equal 24 Portipoises. 40 Snucks equal 10 Portipoises. 4 Soifsonges equal 90 Shinutaes. I have 96 Snucks. 27 Smatts equal 36 Portipoises. 4 Soifsonges equal 2 Smatts. 300 Snucks equal 75 Portipoises. 9 Krustys equal 29 Portipoises. 59 Krustys equal 40 nannas. 600 Snucks equal 150 Portipoises. 90 Smatts equal 120 Portipoises. 10 Snucks equal 2.5 Portipoises. 9 Krustys equal 29 Portipoises. 23 Krustys equal 38 nannas. 4 Soifsonges equal 90 Shinutaes. 300 Snucks equal 75 Portipoises. 9 Smatts equal 12 Portipoises. 59 Krustys equal 40 nannas. 9 Krustys equal 29 Portipoises. 4 Soifsonges equal 90 Shinutaes. How many Soifsonges is the amount of Snucks I have equivalent to?
(A) 0 (B) 36 (C) 30 (D) None of these

Question 12 is worth 4 points

12. What is the length of the shortest path from point A to point F in the Rectangle below multiplied by the number of integer answers for x in the equation $23 < x < 56$? (Figure not to scale).



- (A) 416 (B) 429 (C) 442 (D) 13

2003 Mount Rainier Math Invitational
Fifth Grade Team Who Wants to be a Mathematician
Answers

1. A
2. A
3. A
4. A
5. B
6. D
7. D
8. C
9. D
10. C
11. B
12. A

2003 Mount Rainier Math Invitational
Fifth Grade Team Algebra

Written by Kjell Hansen

Questions 1-5 are worth 2 points each

- 1) If it takes ten fifth graders to screw in 5 light bulbs, how many fifth graders does it take to screw in 1 light bulb?
- 2) In 15 minutes, a passenger walks from the back to the front of a one-mile long bullet train. The train travels 20 miles during this time. In miles per hour, what is the passenger's average speed for this trip?
- 3) Marmaduke has an imaginary friend who never ages. Six years ago, the sum of their ages was 42. If Marmaduke is now 18 years old, in how many years will he be as old as his imaginary friend?
- 4) I sleep 8 hours a night and I spend 25% of that time dreaming. Half of my dreams are about flying and half are about falling. Half the time that I dream I'm flying, I also imagine I have wings. How many minutes a night do I spend dreaming that I have wings while I'm flying?
- 5) $K + J = E$ and $J + E = L$. Given $K = 3$ and $J = 5$, find the value of $K + J + E + L + L$.

Questions 6 - 10 are worth 3 points each

- 6) The two digits of A are the reverse of the digits of B (like 31 and 13). $A+B=88$. $AB=1207$ and $A>B$. What is A ?
- 7) $4 + 1/x = 17$. $26x = y$. What does $3y$ equal?
- 8) Benjamin can eat one pizza every half hour and cannot eat more than 3 pizzas. Matthew can eat one pizza every 15 minutes. If they have 11 boxes of pizza, how quickly can they eat all of it?

(next page)

- 9) Your mom goes fishing. She throws back every other fish she catches, and she throws every third fish she catches up in the air and an eagle swoops in and takes it. She keeps the rest of the fish in her purse. If your mom catches one fish every 3 minutes, how long will it take for her to get 6 fish in her purse?
- 10) Balthazar has 90 friends, 30 of them are on math team, 40 of them are seniors. If 40 of his friends are not seniors and are not on math team, how many of his friends are seniors on math team?

2003 Mount Rainier Math Invitational
Fifth Grade Team Algebra
Written by Kjell Hansen

Answers

- 1) 2
- 2) 84
- 3) 12
- 4) 30
- 5) 42
- 6) 71
- 7) 6
- 8) 2 hours
- 9) 51 min
- 10) 20

2003 Mount Rainier Math Invitational
Fifth Grade Team Pressure Round
Written by Dana Wen

Reduce all fractions. You must turn in an answer to a problem at 3, 6, 9, 12 and 15 minutes. The first answer turned in is worth 3 points, the second 4 points, ..., and the fifth is worth 7 points.

1. What is the greatest common factor of 21 and 35?

2. At the grocery store, green bananas cost 5¢ each and brown bananas cost 15¢ each. Harry spent \$1.05 and bought 9 bananas. How many brown bananas did he buy?

3. What is $10 + 9 * 8 * 7 * 6 * 5 * 4 * 3 * 2 * 1 * 0$?

4. Josh has a toy box with 16 dinosaurs in it. When he counts his dinosaurs, he discovers that he has 8 blue dinosaurs, 5 red dinosaurs, 2 green dinosaurs, and 1 yellow dinosaur. Josh randomly takes one dinosaur out of the box and throws it at Dana. He then takes another dinosaur out of the box and throws it at Dana, also. What is the probability that both of the dinosaurs Josh threw were blue?

5. Jack has a tropical paradise pond with goldfish in it. One day, Jack wakes up and discovers that someone has been stealing his goldfish! Only $\frac{1}{3}$ of them are left in the pond. The next day, Jack wakes up and sees that $\frac{1}{2}$ of the remaining fish have been stolen. He now only has 10 goldfish left. How many goldfish did Jack originally have swimming in his tropical paradise pond?

2003 Mount Rainier Math Invitational
Fifth Grade Team Pressure Round
Written by Dana Wen

Answers

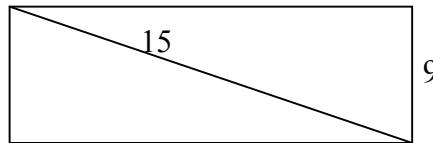
- 1) 7
- 2) 6 brown bananas
- 3) 10
- 4) $\frac{7}{30}$
- 5) 60 goldfish

2003 Mount Rainier Math Invitational
Fifth Grade Team Geometry Test
Written by Robert Cunningham and Nick Moen

Reduce all fractions and answers should be left in terms of π .

Questions 1-5 are worth 2 points each

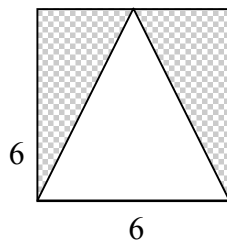
- 1) The area of a rectangle is 65. The length is 13, what is its width?
- 2) In a right triangle, the two legs (shorter sides) are 6 and 8 units. What is the length of the last side?
- 3) The diagonal of the rectangle is 15 and the height 9, what is the area of the rectangle?



- 4) How many diagonals are in a regular octagon? (An 8-sided figure.)
- 5) How many cubic feet are in a box 16 inches x 8 inches x 4 inches?

Questions 6 - 10 are worth 3 points each

- 6) What is the area shaded region in the figure below?



- 7) What is the area of a triangle with base 15 and height 16?

(next page)

8) Eric has a square sandwich with side length 5. Jordan comes and takes a semi-circular bite out of it with radius 2. What is the area left in the sandwich? (Assume that the sandwich is infinitely thin; leave answers in terms of π)

9) What is the volume of a pentagonal prism with base area 15 and a height of 3?

10) What is the radius of a cylindrical pop can with volume 45π and height 5?