

Edmonton Junior High Math Contest 2012

Place your answers on the answer sheet provided.

Part A: Multiple Choice: Each correct answer is worth 4 points. Each unanswered question is worth 2 points to a maximum of 3 unanswered questions.

1. The product of four positive integers is 1365. Which of the following could not be the sum of any three of the integers?
 - A) 15
 - B) 21
 - C) 23
 - D) 24
 - E) 25
2. Eight cards are placed facedown. Each has one of the following numbers: 2, 3, 6, 7, 8, 9, 15, and 18. If you and your friend each turn over one of them, what is the probability, to the nearest whole %, that the sum of the pair of turned up cards is odd?
 - A) 47%
 - B) 50%
 - C) 57%
 - D) 60%
 - E) 67%
3. Five different integers have a sum of -6 . The first integer is two greater than the third. The second and fifth integers are opposite. The fourth integer is two greater than the second, and it is double the third. Which of the following must be one of the integers?
 - A) 7
 - B) 6
 - C) 5
 - D) 4
 - E) 3
4. A cube is $3\text{ cm} \times 3\text{ cm} \times 3\text{ cm}$. The complete surface is painted green. It is cut into congruent cubes that are $1\text{ cm} \times 1\text{ cm} \times 1\text{ cm}$ (unit cubes). What is the ratio of unit cubes with exactly 2 green faces to unit cubes with exactly 3 green faces?
 - A) 5:27
 - B) 4:3
 - C) 2:3
 - D) 3:4
 - E) 3:2
5. A square picture has a side length of 28 cm, and a circular picture has a diameter of 30 cm. They both have a uniform 5 cm border enclosing the exposed area of its photo. For which picture is the ratio of the exposed area of its photo to its border area, the greatest, and what is that ratio?
 - A) The square picture, with a ratio of 0.70:1
 - B) The circular picture, with a ratio of 0.80:1
 - C) The square picture, with a ratio of 2.07:1
 - D) The circular picture, with a ratio of 2.27:1
 - E) Both have the same ratio of 0.75:1

Part B: Short Answer: Place the answer in the blank provided on the answer sheet. Each correct answer is worth 5 points.

6. Connor walked an average of 6 km/h from his home to a park. When he returned along the same route, he averaged 6 km/h. At the half way point from the park to home, he remembered he left his watch behind and ran back to the park at 9 km/h. Once he found his watch, he walked back home at 6 km/h. What was Connor's average speed, rounded to the nearest tenth of km/h, for the whole trip?

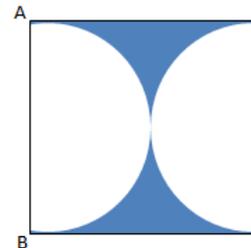
7. An artist mixes a shade of paint that is $33\frac{1}{3}\%$ red, 15% yellow and the rest blue. He then mixes a second shade of paint using only red and blue in a 3:1 ratio. If the artist then combines 300 mL of the first shade with 120 mL of the second shade and 85 mL of blue, what percent of the resulting shade of paint will be blue? (Express your answer to the nearest whole %.)

8. In a collection of 48 coins, one is counterfeit, and it has a mass that is slightly less than all of the other identical coins. What is the minimum number of mass comparisons required, using a balance scale, to ensure that the counterfeit coin is discovered?

9. The square root of $\frac{1}{25}$ of a composite number is 4 less than the sixth prime number.

What is the composite number?

10. What is the area of shaded region shown at the right, to the closest whole square centimetre, if the length of semicircle AB is 18.85cm?



11. A pet shop has 1500 pets that are either: cats, dogs or birds. Of this total, 55% are cats and 20% are dogs. A group of cat lovers bought cats only, until just 40% of the remaining pets were cats. How many cats were bought by the cat lovers?

12. In the Real Number System of Mathematics, how many of the following statements are true?

- 1 is a prime number.
- $\sqrt{-25} = -5$
- $\pi = 3.14$
- $\frac{x^3}{x^0 - 1} \geq 0, x > 0$
- $-n^4 = (-n)^4$
- $\sqrt{x^{100}} = x^{10}$
- If a 3-D object is a right square prism, it must be a cube.

13. Wong's Fortune Cookies are sold in 4 different sizes of packages. Compared to the largest size, the three smaller sizes contain, respectively: $\frac{1}{3}$ as many cookies, $\frac{1}{2}$ as many cookies, and $\frac{3}{4}$ as many cookies. If you buy one of each of the four sizes of packages, you will get 62 cookies. How many cookies are in the second-smallest package?

14. What is the ten's digit of the smallest multiple of 13 whose unit's digit is greater than 0 but less than its hundred's digit?

Part C: Short Answer: Place the answer in the blank provided on the answer sheet. Each correct answer is worth 7 points.

15. John wrote a computer program which changes numbers. If he enters a number x , the program outputs the number: $\frac{1}{1-x}$. For example, if John enters the number 3, the output is: $\frac{1}{1-3} = -\frac{1}{2}$.

Two is the first number John enters which results in an output of -1. John will then take this new output and use it for his next input. What will be the computer's 2012th output?

16. How many positive integers up to 2012 have the ones (units) digit either 1 or 8?

17. A level road of length 16 km links A and B. From B, the road goes uphill to C. Kelly and Kerry both ride their bikes at 8 km/h on level roads, 5 km/h uphill and 10 km/h downhill. Kelly starts from A and goes towards C, while Kerry starts from C and goes towards A. They meet at a point on the level road 4 km from B. They continue to their respective destinations and turn around immediately. Where will they meet the second time?

18. Three regular polygons of equal side lengths fit perfectly around a point. If the first polygons has 5 sides and the second has 10 sides, what is the number of sides of the third polygon?

19. In the diagram below, O is the centre of a circle of radius 1. A and B are two points on the circle. $\angle AOB = 45^\circ$. D is a point on radius OB so that segment AD is perpendicular to OB.

Find the area of the shaded region.

Write the answer in decimal form, round the answer to the nearest hundredth.

