

Blitz, Page 1

1. Evaluate  $7 + 8 + 9 + 10 + 11 + 12 + 13$ .

1. \_\_\_\_\_

2. The perimeter of a rectangle is 40 cm. One side of the rectangle is 7 cm. What is the area of the rectangle?

2. \_\_\_\_\_  $\text{cm}^2$

3. Joshua answered 22 of the 55 Math Challengers practice questions correctly. How many percent of the practice questions did Joshua answer correctly?

3. \_\_\_\_\_ percent

4. Three teams participated in a hockey tournament, and every team played every other team twice. How many games were played in the tournament?

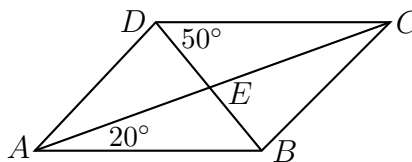
4. \_\_\_\_\_ games

5. The mean and the median of 5 different positive integers are both equal to 3. What is the largest of the 5 integers?

5. \_\_\_\_\_

6. In the diagram below,  $ABCD$  is a parallelogram, and the diagonals  $AC$  and  $BD$  meet at  $E$ . Given that angle  $BAC$  is 20 degrees, and angle  $CDB$  is 50 degrees, how many degrees are in angle  $AEB$ ?

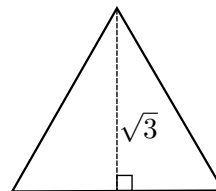
6. \_\_\_\_\_ degrees



7. Evaluate  $\frac{1 \times 4 \times 9 \times 16 \times 25}{(1 \times 2 \times 3 \times 4 \times 5)(1 \times 3 \times 5)}$ .

7. \_\_\_\_\_

8. Call a prime  $p$  *lonely* if neither  $p - 2$  nor  $p + 2$  is prime. What is the smallest lonely *odd* prime? 8. \_\_\_\_\_
9. Twenty percent of a certain positive number  $x$  multiplied by 40% of the same number is equal to 18. What is the value of  $x$ ? 9. \_\_\_\_\_
10. You are told that a box contains a total of 6 coins, including at least one penny, at least one nickel, and at least one dime. Given this information, what is the smallest conceivable sum of money you can make using exactly 5 of these coins? 10. \_\_\_\_\_ cents
11. It took 25 minutes to drive from Alicia's home to the math contest at SFU. If the distance travelled was 20 km, what was the average speed of the drive in km/hr? 11. \_\_\_\_\_ km/hr
12. Two standard dice are tossed. What sum has the highest probability? 12. \_\_\_\_\_
13. Evaluate  $\frac{2^3}{3^{-2}}$ . 13. \_\_\_\_\_
14. What is the perimeter of an equilateral triangle whose heights are all equal to  $\sqrt{3}$  units? 14. \_\_\_\_\_ units



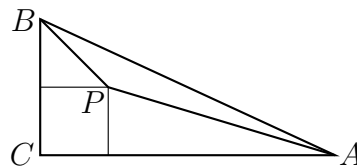
15. The hospital where Alicia works was privatized. The number of hours Alicia works per week went *up* by 20%, and her total weekly earnings went *down* by 13%. By how many percent did Alicia's hourly wage decrease? Give the answer as a decimal, to the nearest tenth of a percent. (An answer like 19.2 percent is of the right shape.) 15. \_\_\_\_\_ percent

16. Let  $x = \sqrt{1} + \sqrt{2} + \sqrt{3} + \sqrt{4}$ . What is the integer *nearest* to  $x$ ? 16. \_\_\_\_\_

17. The interior of cooking pot A is a cylinder with base radius 8 cm and height 10 cm. The interior of cooking pot B is a cylinder with base radius 16 cm and height 40 cm. Pot A is filled with water and the contents are poured into pot B. After this has been done *twice*, how many cm deep is the water in pot B? 17. \_\_\_\_\_ cm

18. Two cubical dice each have the numbers 1, 2, 4, 8, 16, and 32 written on their faces, one number on each face. The two dice are rolled. What is the probability that the *sum* of the numbers on top of the two dice is odd? Write the answer as a common fraction. 18. \_\_\_\_\_

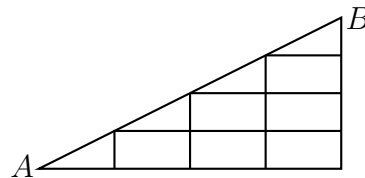
19. In the picture below,  $\triangle ABC$  is right-angled at  $C$ . The leg  $CA$  has length 22 cm, and the leg  $CB$  has length 10 cm. Point  $P$  inside the triangle is at distance 5 cm from each of  $CA$  and  $CB$ . What is the area of  $\triangle PAB$ ? 19. \_\_\_\_\_  $\text{cm}^2$



20. Let  $N = 2 \times 4 \times 6 \times 8 \times \dots \times 48 \times 50$ . How many consecutive zeros does the decimal representation of  $N$  end with? 20. \_\_\_\_\_ zeros

21. A box contains 88 balls, with the numbers 1 to 88 written on them, one number per ball. How many balls must you remove from the box to be *certain* that among the numbers removed, there are at least two whose difference is divisible by 8? 21. \_\_\_\_\_ balls
22. An 800 metre long train travelling forward at 20 metres per second went through a tunnel. The *front* of the train emerged from the tunnel 50 seconds after the *rear* of the train entered the tunnel. What is the length of the tunnel in metres? 22. \_\_\_\_\_ metres
23. Twenty percent of the people who like chocolate like hot pepper. Ninety percent of the people who like hot pepper like chocolate. All people like one or the other or both. What fraction of the people like both? 23. \_\_\_\_\_
24. For how many positive integer values of  $n$  is  $3n - 1$  a factor of  $2^{2010}$ ? 24. \_\_\_\_\_ values

25. The lines in the picture below show the streets of a village. (Note the diagonal street.) A path from A to B is *efficient* if as you travel it you get ever closer to B. How many efficient paths are there from A to B? 25. \_\_\_\_\_ paths



26. A desert outpost has its water supply stored in a cistern. Each person at the outpost uses water at the same constant rate. In addition, water evaporates from the cistern at a constant rate. There is enough water in the cistern to supply 40 people for 45 days, or 50 people for 40 days. For how many days can the cistern supply 60 people? 26. \_\_\_\_\_ days

## Bull's-eye, Page 1: Problem Solving

1. A car travels 6.5 kilometres in 5 minutes. At this speed, how many km does it travel in an hour? 1. \_\_\_\_\_ km
2. A carton of apple juice costs 60 cents. A carton of mango juice costs 1 dollar. How many different ways can Alicia spend a total of *exactly* \$34.60 on cartons of apple juice and/or mango juice? 2. \_\_\_\_\_ ways
3. A restaurant bought 1800 dollars' worth of wine at \$9 a bottle and 1800 dollars' worth of wine at \$15 a bottle. What was the restaurant's average cost per bottle? Give the answer in dollars, as a decimal, to the nearest cent. (An answer of 12.34 is of the right shape.) 3. \_\_\_\_\_ dollars
4. Assume that weights of coins are as follows: 1 cent coin (penny), 3 grams; 5 cent coin (nickel), 5 grams; 10 cent coin (dime) 2 grams; 25 cent coin (quarter), 9 grams; 1 dollar coin (loonie), 13 grams; 2 dollar coin (toonie), 17 grams. Dan holds at least one of each of the above coins, with a total weight of exactly 220 grams. What is the maximum possible total value of his coins? Give the answer in dollars, to the nearest cent. 4. \_\_\_\_\_ dollars

## Bull's-eye, Page 2: Numbers and Combinatorics

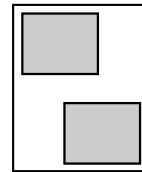
5. Four fair coins are tossed. What is the probability that there are exactly 2 heads? Express the answer as a common fraction. 5. \_\_\_\_\_
6. Alicia wrote down all the numbers from 40 to 600. How many times did she write the digit 5? 6. \_\_\_\_\_ times
7. Two standard dice are rolled, a white one and a black one. Let  $W$  be the number showing on the white one and  $B$  the number showing on the black one. What is the probability that  $W < 2B$ ? Express the answer as a common fraction. 7. \_\_\_\_\_
8. What is the remainder when 8. \_\_\_\_\_
- $$1^4 + 3^4 + 5^4 + 7^4 + 9^4 + 11^4 + 13^4 + 15^4 + 17^4 + 19^4$$
- is divided by 10?

Bull's-eye, Page 3: Geometry

9. The volume of a cone is  $484\pi$  cubic cm, and the height of the cone is 12 cm. What is the radius (in cm) of the base of the cone? 9. \_\_\_\_\_ cm

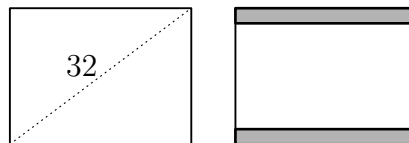
10. The radius of the base of a cylinder is increased by 50% and the height is decreased by 50%. By how many percent does the volume of the cylinder increase? Give the answer as a decimal to the nearest tenth. 10. \_\_\_\_\_ percent

11. A poster is 40 cm wide. There are two pictures on the poster. Each picture is 24 cm wide and 20 cm high. Together the pictures take up four-ninths of the area of the poster. What is the height (in cm) of the poster? 11. \_\_\_\_\_ cm



12. In older TVs, the ratio of screen width to screen height is 4:3. In newer flat-screen TVs, the ratio of screen width to screen height is 16:9. Both pictures below show a 32-inch 4:3 screen TV. (Here 32-inch means that the *diagonal* measures 32 inches.) 12. \_\_\_\_\_ inch

A newer TV show has been shot for 16:9 TVs. When it is viewed on a 4:3 TV, equal grey bands are produced at the top and bottom, so that the rest of the picture is in the correct 16:9 ratio. What is the vertical height in inches of *one* of these grey bands? Express the answer as a decimal, to the nearest tenth of an inch.



Co-op, Page 1: Team answers must be on the *coloured* page.

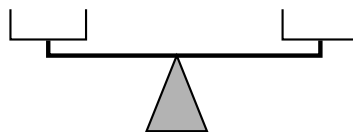
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1. Let  $x * y = \frac{x}{x + y}$  for  $x \neq -y$ . If  $x * y = 9$ , what is the value of  $y * x$ ? 1. \_\_\_\_\_

2. How many integers between 0 and 999 are there that are divisible by 6 and whose rightmost decimal digit is equal to 6? 2. \_\_\_\_\_ integers

3. One corner of a square is at the origin  $(0, 0)$ . The diagonally opposite corner is at  $(1, 11)$ . What is the area of the square? 3. \_\_\_\_\_

4. The *Factoria*<sup>TM</sup> balance scale comes with one 1 gram weight, two 2 gram weights, three 6 gram weights, four 24 gram weights, five 120 gram weights, and six 720 gram weights. What is the total number of weights one must put in one pan of the scale so as to to balance a 2 kilogram bag of flour in the other pan? 4. \_\_\_\_\_ weights

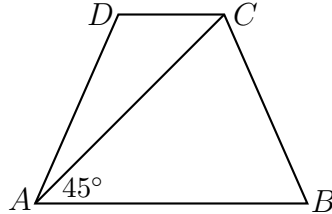




Co-op, Page 2: Team answers must be on the *coloured* page.

Answers on a white page will not be graded.

5. The trapezoid  $ABCD$  has  $AB$  parallel to  $DC$  and  $BC = AD$ . Given that  $AC = 14$  and  $\angle CAB = 45^\circ$ , what is the area of trapezoid  $ABCD$ ? 5. \_\_\_\_\_



6. What is the least positive integer  $n$  such that  $n$  is a multiple of 6 and neither  $n - 1$  nor  $n + 1$  is prime? 6. \_\_\_\_\_

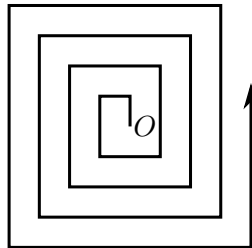
7. Four runners compete in a 100 meter race. How many possible orders of finish are there, if ties are allowed? For example, Alicia might win, with Beth, Cecil, and Deedee in a three-way tie for second. Or else Alicia and Cecil could tie for first, with Beth and Deedee tied for third. Or else Beth and Cecil could tie for first, with Alicia and Deedee tied for third. Or else there could be a four-way tie. There are other possibilities, including many with no tie at all. 7. \_\_\_\_\_ orders

Co-op, Page 3: Team answers must be on the *coloured* page.

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8. There were 9 candidates for the 5 town council positions, and each of the 1000 voters voted for 5 people. Each candidate got a different total number of votes, and Epsilon came in fifth. What is the smallest number of votes that Epsilon could have received? 8. \_\_\_\_\_ votes

9. Alan is at the origin  $O$  and starts walking. He walks 1 unit up, 1 unit to the left, 2 units down, 2 units to the right, 3 units up, 3 units to the left—he is now at the point with coordinates  $(-2, 2)$  after walking a total of 12 units. Then he walks 4 units down, 4 units to the right, 5 units up, and so on. Let the coordinates of the point where he ends up after walking a total of 444 units be  $(a, b)$ . What is the value of  $a + b$ ? 9. \_\_\_\_\_



10. A 5-letter “word” that uses all the letters of the word RAINY is called *deranged* if none of the letters occurs in the same position as in RAINY. Thus IRAYN is deranged, while YANRI is not deranged (since A occurs in the same position as in RAINY). Note also that ARINY and RAINY are not deranged. How many deranged words are there? 10. \_\_\_\_\_ words