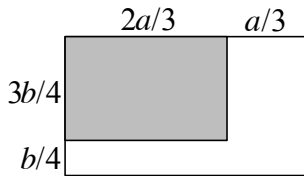


1. How many metres are in 1.6 km? \_\_\_\_\_ (m) 1
2. Round  $32\frac{1}{2.2}$  to the nearest whole number. \_\_\_\_\_ 2

3. The large rectangle in the figure below has sides  $a$  and  $b$ . What fraction of the large rectangle is shaded?



- \_\_\_\_\_ 3
4. Express the sum as a common fraction:  $1 + \frac{4}{6 \times 7} + \frac{1}{6} + \frac{1}{7}$  \_\_\_\_\_ 4

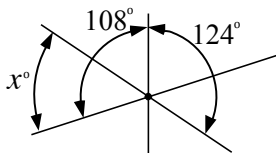
5. In 2012, February will have 29 days. It will have 5 Wednesdays. On what day of the week is February 14, 2012? \_\_\_\_\_ 5

6. Ann took 8 tests (marks are out of 100). Her average on the first 7 tests was 56. Ann's mark on the 8th test was 96. What was Ann's average on the 8 tests? \_\_\_\_\_ 6

7. Many of the 204 Canadian athletes who participated in the Winter Olympics won medals. In total, 4 Canadians won four medals each, 6 won three medals each, 16 won two medals each, and 91 won one medal each. The rest did not win any medal. How many Canadian athletes did not win any medal? \_\_\_\_\_ 7

8. Let  $N = 2^{2010}$ . What is the remainder if you divide  $N$  by 5? \_\_\_\_\_ 8

9. The three lines in the figure intersect at a single point. The angles between pairs of lines are shown. What is the value (in degrees) of  $x$ ?



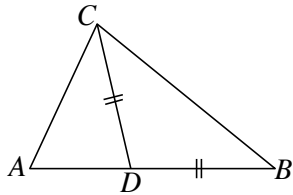
\_\_\_\_\_ (°) 9

Grade Seven (7) Division

10. One loaf of bread and six rolls cost \$5.45. At the same prices, two loaves of bread and four rolls cost \$7.30. What is the cost (in dollars) of one loaf of bread? Give your answer in decimal form. \_\_\_\_\_ (\$)

11. What is the sum of all the prime factors of 2010? \_\_\_\_\_ 11

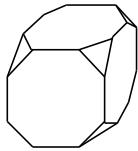
12. The measure of  $\angle BCA$  is  $76^\circ$  and  $CD$  is its angle bisector. Triangle  $DBC$  is isosceles ( $DB = DC$ ). What is the measure (in degrees) of  $\angle BAC$  ?



\_\_\_\_\_ ( $^\circ$ ) 12

13. The 6-digit odd number  $N$  uses only the digits 1, 2, and 3, two of each. The two 1s are separated by one digit, the two 2s are separated by two digits, and the two 3s are separated by three digits. What is the value of  $N$  ? \_\_\_\_\_ 13

14. Nick sawed off all vertices of a wooden cube (see figure). How many edges does the new solid have?



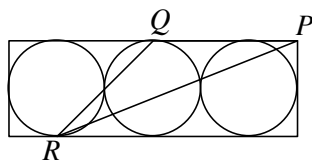
\_\_\_\_\_ 14

15. The sum of 6 consecutive prime numbers is 180. What is the value of the largest of these prime numbers? \_\_\_\_\_ 15

16.  $N$  is the product of three different prime numbers. How many positive factors does  $N$  have? Note that 1 and  $N$  are factors of  $N$  . \_\_\_\_\_ 16

17. Three water pipes are used to fill a swimming pool. The first pipe by itself takes 8 hours to fill the pool, the second pipe by itself takes 12 hours to fill the pool, and the third pipe by itself takes 24 hours to fill the pool. If all three pipes are used at the same time, how many hours will it take to fill the pool? \_\_\_\_\_ (hr) 17

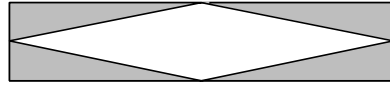
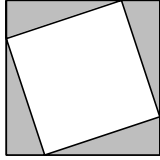
18. Three circles, each with area  $116\pi$ , are inscribed in a rectangle as in the figure below. Point  $P$  is a corner of the rectangle, and points  $Q$  and  $R$  are points of tangency. Find the length of  $PR$  .



\_\_\_\_\_ 18

Grade Seven (7) Division

19. The outer square of the left figure has sides 5. Each of the four shaded right-angled triangles has legs 1 and 4. The shaded triangles are placed at the corners of the rectangle on the right. What is the area of the inner (unshaded) rhombus on the right?



\_\_\_\_\_ 19

20. A perfect square is a number like  $0 = 0^2$ ,  $1 = 1^2$ ,  $4 = 2^2$ ,  $9 = 3^2$ , or  $16 = 4^2$ . Let  $N = 2010^2$ . How many positive perfect squares divide  $N$ ?

\_\_\_\_\_ 20

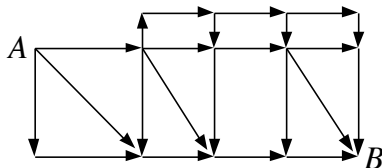
21. Two athletes, A and B, competed in the 3000 metre speed skating race at the Richmond Olympic Oval. When A finished, B was still 144 metres from the finish line. If A finished the entire race in 288 seconds, what was the average speed of B (in metres per minute) over these 288 seconds?

\_\_\_\_\_ (m/min) 21

22. How many 3-digit whole numbers have digit sum less than 5?

\_\_\_\_\_ 22

23. The line segments represent one-way streets. One can only travel in the direction of the arrows. How many paths are there from  $A$  to  $B$ ?

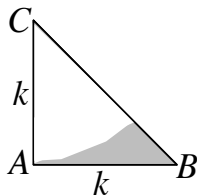


\_\_\_\_\_ 23

24. Define  $x \nabla y = (x + 2)(y - 1)$ . What is the value of  $(2 \nabla 3) \nabla (2 \nabla 0)$ ?

\_\_\_\_\_ 24

25. The right triangle  $ABC$  is isosceles, where  $AB = AC = k$ , and  $k$  is an integer. The shaded region is bounded by two sides of the triangle and by an arc of a circle with radius  $k$  and centre at  $C$ . The area of the shaded region, when rounded to the nearest whole number is 13. Find the value of  $k$ . (Hint: Find an expression for the shaded area in terms of  $k$ .)



\_\_\_\_\_ 25

26. You roll three dice, and are told that one or more of the dice shows a 1. Given this information, what is the probability that the sum of the three numbers you rolled is 4? (Hint: Find how many ways there are to roll so that one or more dice shows a 1.)

\_\_\_\_\_ 26