PROVINCIAL 2011 FACE-OFF
QUESTIONS AND ANSWERS

1. What is the value of $\dfrac{(4!)(5!)}{6!}$?

1. Answer: 4

2. Evaluate $(2011)^2$.

2. Answer: 4,044,121 (4 million 44 thousand 121)

3. Three congruent squares are placed side by side to make a rectangle. If the perimeter of the rectangle is 40 cm, what is the number of cm^2 in the area of the rectangle?

3. Answer: 75 (cm^2)

4. A 10.5 fluid ounce can of tomato paste costs \$1.68. What is the cost, in cents, per fluid ounce?

4. Answer: 16 (cents)

5. What is the smallest integer which is a power of 4 and is larger than 2011?

5. Answer: 4096

6. Alice and Bob independently choose an integer from 1 to 10 at random. What is the probability that they choose *different* integers? Express the answer as a common fraction.

6. Answer: $\dfrac{9}{10}$

7. What is the smallest whole number that has 6 whole number divisors?
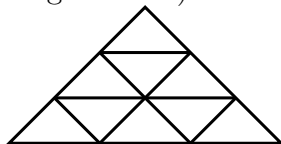
7. Answer: 12

8. Evaluate $5^5 - 55^2$.

8. Answer: 100

9. Two fair dice are tossed. What is the probability that the sum is *less* than 7? Express the answer as a common fraction.

9. Answer: $\dfrac{5}{12}$

10. How many triangles (including all sizes) are in the picture below?

10. Answer: 13 (triangles)

11. In how many ways can you make change for a quarter using pennies and/or nickels and/or dimes?

11. Answer: 12 (ways)

12. The surface area of a sphere is 36π cm^2. What is the number of cm^3 in the volume of the sphere? Express the answer in terms of π.

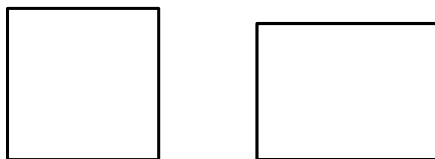**12. Answer:** 36π (cm^3)

13. Given that $(x + y)^2 = 200$, $x^2 = 65$, and $y^2 = 35$, what is the value of xy?

13. Answer: 50

14. Evaluate $(23 \times 8) + (8 \times 14) + (13 \times 8)$.

14. Answer: 400

15. Two opposite sides of a 10×10 square are each increased by 20%, and the other two sides are each decreased by 10%. By how many percent is the perimeter of the resulting rectangle greater than the perimeter of the original square?

15. Answer: 5 (percent)

16. What is the largest prime factor of the sum of the two smallest 3-digit primes?

16. Answer: 17

17. A movie has a running time of 100 minutes. The first showing starts at 7:00 PM, and there is a 20 minute interval between the end of the first showing and the beginning of the second showing. At what time does the second showing end? Give the answer in the usual Hours:Minutes format.

17. Answer: 10:40 (PM)

18. Three standard dice are tossed. How many possible sums are there?

18. Answer: 16 (sums)

19. How many integers x satisfy the equation

$$x^2(x^2 - 1)(x^2 - 2)(x^2 - 3)(x^2 - 4) = 0?$$

19. Answer: 5 (integers)

20. The width of the Atlantic Ocean is increasing at 2.5 centimetres per year. At this rate, how many years will it take for the width of the Atlantic Ocean to increase by 1 kilometre?

20. Answer: 40,000 (years)

21. Two fair dice are tossed. What is the probability that one of the dice shows a 5 and the other shows a number which is less than 5? Express the answer as a common fraction.

21. Answer: $\dfrac{2}{9}$

22. What is the sum of all the prime factors of 222?

22. Answer: 42

23. In the grid below, each of the 6 points is at distance 1 from its nearest horizontal and vertical neighbours. How many lines are there that pass through 2 or more points in the grid?

$$\begin{matrix} \bullet & \bullet & \bullet \\ \\ \bullet & \bullet & \bullet \end{matrix}$$
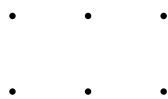
23. Answer: 11 (lines)

24. You buy an MP3 player whose price is $80, plus 12% HST. If you hand the cashier five $20 bills, how much should you get back in change? Give the answer in dollars, to the nearest cent. Thus an answer like 12.49 or 12.50 is of the right shape.

24. Answer: 10.40 (or 10 dollars and 40 cents, or ten forty)

25. Alicia has \$1 coins, \$2 coins, or a mixture, but no other coins. She has a total of 33 coins, worth a total of \$52. How many \$1 coins does she have?

25. Answer: 14 (1 dollar coins)

26. A string which is 80 cm long is cut into four pieces whose lengths are in the ratio 1:3:5:7. What is the number of cm in the length of the longest piece?

26. Answer: 35 (cm)

27. One (US) pound is 16 ounces. Given that chicken A weighs 3 pounds, 15 ounces, while chicken B weighs 5 pounds, 1 ounce, what is the ratio of the weight of A to the weight of B? Express the answer as a common fraction.

27. Answer: $\dfrac{7}{9}$

28. Of the people at the junior basketball game, 40% paid the full \$10 ticket price, 40% got in at half-price, and the remaining 100 people paid nothing. What was the total income, in dollars, from ticket sales?

28. Answer: 3000 (dollars)

29. How many subsets of the set $\{1, 2, 3, 4\}$ contain at least one even number? (The whole set is a subset of itself.)

29. Answer: 12 (subsets)

30. The Executive Committee consists of 2 men and 3 women. In how many ways can these 5 people be seated in a row so that the 2 men are next to each other?

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30. Answer: 48 (ways)

31. Ball-point pens can be bought individually at 40 cents each, or at \$4 per package of 12 pens. You need to buy 36 ball-point pens. How much do you save by buying the pens in packages of 12 instead of individually? Give the answer in dollars, to the nearest cent.

31. Answer: 2.40 (or "two-forty" or "two dollars and forty cents")