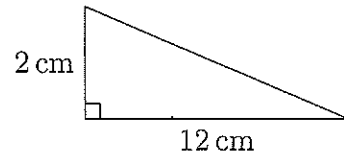


Questions – Intermediate Division

2015

1. What is the area of this triangle in square centimetres?

(A) 10 (B) 12 (C) 14 (D) 7 (E) 6



2. A movie lasts for $2\frac{1}{3}$ hours. The movie is shown in two equal sessions. For how many minutes does each session last?

(A) 85 (B) 70 (C) 80 (D) 65 (E) 75

3. If $p = 11$ and $q = -4$, then $p^2 - q^2$ equals

(A) 105 (B) 137 (C) 117 (D) 115 (E) 94

4. $2015 - 20.15$ equals

(A) 1984.85 (B) 1995.15 (C) 1994.85 (D) 1995.85 (E) 2035.15

5. What is the value of 2015 twenty-cent coins?

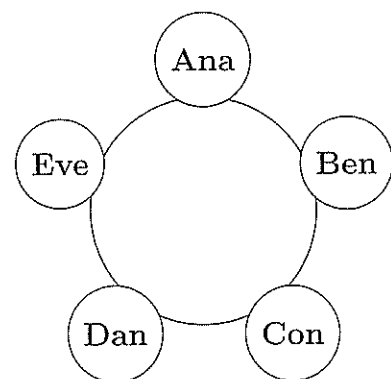
(A) \$2015 (B) \$107.50 (C) \$17.50 (D) \$403 (E) \$43

6. Ana, Ben, Con, Dan and Eve are sitting around a table in that order. Ana calls out the number 1, then Ben calls out the number 2, then Con calls out the number 3, and so on. After a person calls out a number, the next person around the table calls out the next number.

Anyone who calls out a multiple of 7 must immediately leave the table.

Who is the last person remaining at the table?

(A) Ana (B) Ben (C) Con
(D) Dan (E) Eve



7. On a farm the ratio of horses to cows is $3 : 2$ and the ratio of cows to goats is $4 : 3$. The ratio of goats to horses is

(A) $5 : 7$ (B) $3 : 8$ (C) $3 : 5$ (D) $5 : 18$ (E) $1 : 2$

8. Warren the window washer starts on the 38th floor of a building that has 12 windows per floor. He washes all of the windows on each floor before moving down to the floor below. Which floor is Warren on after he has washed 141 windows?

(A) 25th (B) 24th (C) 28th (D) 27th (E) 26th

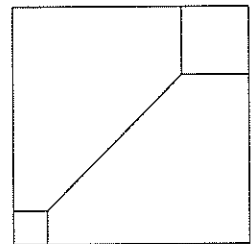
9. A packet of lollies contains 5 blue lollies, 15 yellow lollies and some red lollies. One-third of the lollies are red. What fraction of the lollies are yellow?

(A) $\frac{1}{3}$ (B) $\frac{5}{6}$ (C) $\frac{1}{2}$ (D) $\frac{1}{6}$ (E) $\frac{2}{3}$

10. The diagram shows two small squares in opposite corners of a large square. The squares have sides of length 1 cm, 2 cm and 7 cm.

What is the area of the shaded pentagon?

(A) 18 cm^2 (B) 16 cm^2 (C) 22 cm^2
(D) 24 cm^2 (E) 20 cm^2



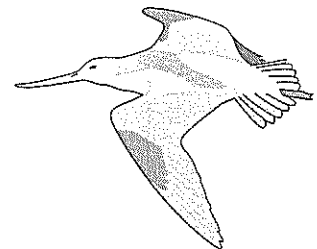
11. Jenna measures three sides of a rectangle and gets a total of 80 cm. Dylan measures three sides of the same rectangle and gets a total of 88 cm. What is the perimeter of the rectangle?

(A) 112 cm (B) 132 cm (C) 96 cm (D) 168 cm (E) 156 cm

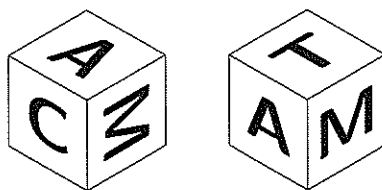
12. A bar-tailed godwit was recorded by satellite tag in 2007 to have flown 11 500 km in eight days.

On average, approximately how many kilometres per hour is that?

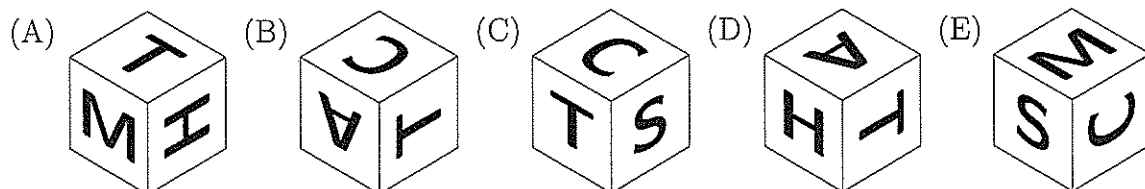
(A) 120 (B) 6 (C) 1 (D) 24 (E) 60



13. A cube has the letters A, C, M, T, H and S on its six faces. Here are two views of this cube.



Which one of the following could be a third view of the same cube?



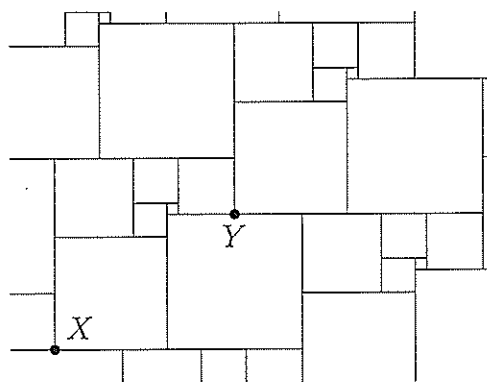
14. Two ordinary dice are rolled. The two resulting numbers are multiplied together to create a score. The probability of rolling a score that is a multiple of six is

- (A) $\frac{1}{6}$ (B) $\frac{5}{12}$ (C) $\frac{1}{4}$ (D) $\frac{1}{3}$ (E) $\frac{1}{2}$

15. The diagram shows part of a tiled floor. The tiles are all squares, of seven different sizes. The smallest tile is $1 \text{ cm} \times 1 \text{ cm}$ and the next smallest is $3 \text{ cm} \times 3 \text{ cm}$.

What is the distance XY ?

- (A) $\sqrt{346} \text{ cm}$ (B) 19 cm
(C) $\sqrt{369} \text{ cm}$ (D) $\sqrt{377} \text{ cm}$
(E) 20 cm



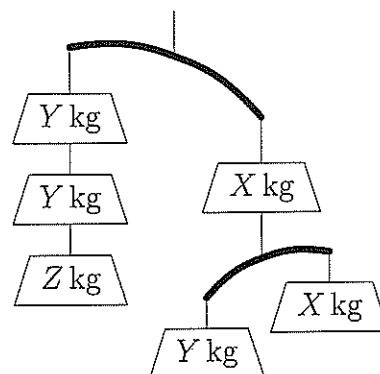
16. How many three-digit numbers have no two digits the same?

- (A) 764 (B) 900 (C) 648 (D) 520 (E) 480

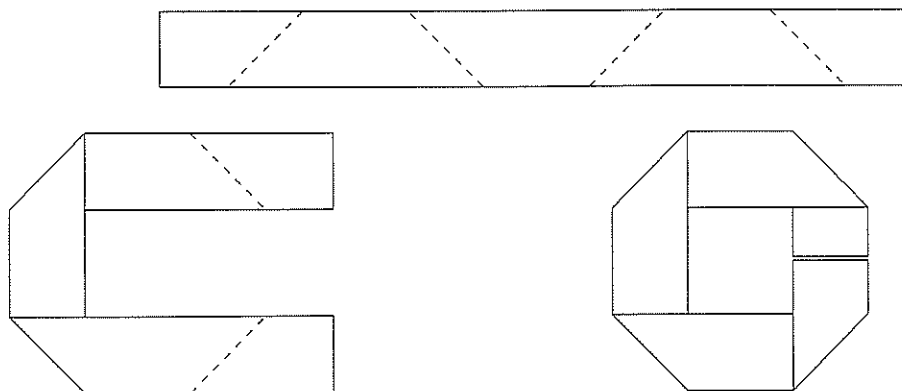
17. The diagram shows two weightless balance beams. Each tips as a result of an imbalance in the hanging weights. Each weight has mass $X \text{ kg}$, $Y \text{ kg}$ or $Z \text{ kg}$, as shown.

Which of the following lists the weights from lightest to heaviest?

- (A) $X < Y < Z$ (B) $X < Z < Y$ (C) $Y < X < Z$
(D) $Y < Z < X$ (E) $Z < X < Y$



18. A strip of paper 1 cm wide is folded 4 times to make a regular octagon as shown.



If the ends of the strip meet exactly when folded, how many centimetres long is the strip?

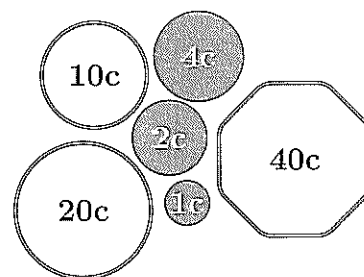
- (A) $8\sqrt{2}$ (B) 8 (C) $4 + 4\sqrt{2}$ (D) 16 (E) $16 - 4\sqrt{2}$

19. The country of Numismatica has six coins of the following denominations: 1 cent, 2 cents, 4 cents, 10 cents, 20 cents and 40 cents.

Using the coins in my pocket, I can pay exactly for any amount up to and including 200 cents.

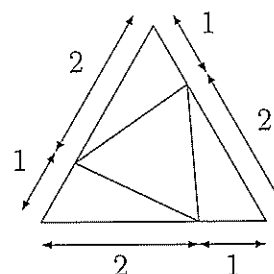
What is the smallest number of coins I could have?

- (A) 12 (B) 10 (C) 11 (D) 9 (E) 8



20. What fraction of the large triangle is shaded?

- (A) $\frac{1}{6}$ (B) $\frac{1}{3}$ (C) $\frac{4}{9}$
(D) $\frac{1}{2}$ (E) $\frac{2}{5}$



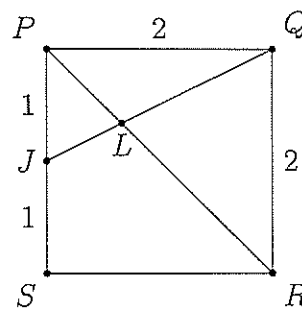
21. A student noticed that in a list of five integers, the mean, median and mode were consecutive integers in ascending order. What is the largest range possible for these five integers?

- (A) 5 (B) 9 (C) 8 (D) 7 (E) 6

22. The square $PQRS$ has sides of length 2 units and J is the midpoint of PS . The line QJ intersects the diagonal PR at L .

The length of LP is

- (A) $\frac{\sqrt{2}}{3}$ (B) $\frac{\sqrt{3}}{3}$ (C) $\frac{\sqrt{2}}{2}$
 (D) $\frac{2\sqrt{3}}{3}$ (E) $\frac{2\sqrt{2}}{3}$



23. For each integer from 0 to 999, André wrote down the sum of its digits. What is the average of the numbers that André wrote down?

- (A) 13.5 (B) 15 (C) 12 (D) 12.5 (E) 10.5

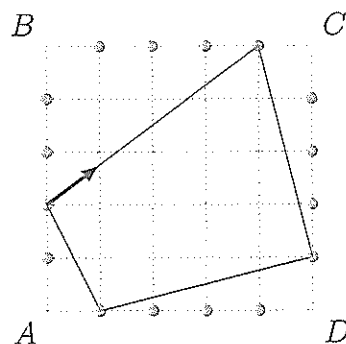
24. Max's journey around this grid starts on a grid point on side AB .

He visits a grid point on each of sides BC , CD and DA in order before returning to his starting point, forming a quadrilateral.

Max does not visit corner points A , B , C or D .

How many journeys are possible which are not rectangles? (Note that a square is a rectangle.)

- (A) 256 (B) 252 (C) 64 (D) 248 (E) 76



25. It takes Nicolai one and a half hours to paint the walls of a room and two hours to paint the ceiling. Elena needs exactly one hour to paint the walls of the same room and one hour to paint the ceiling.

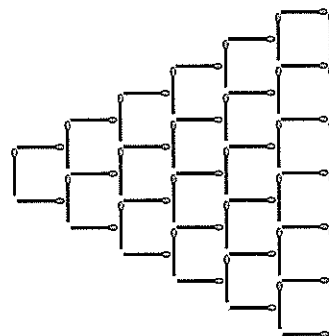
If Nicolai and Elena work together, what is the shortest possible time in minutes in which they can paint the walls and the ceiling of the room?

- (A) 72 (B) 60 (C) 83 (D) 75 (E) 76



The answers to questions 26–30 are three digit numbers (000 to 999).

26. Mike has 2015 matches and uses them to build a triangular pattern like the one shown, but as big as possible. How many matches does he have left over?



27. How many positive integers n less than 2015 have the property that $\frac{1}{3} + \frac{1}{n}$ can be simplified to a fraction with denominator less than n ?
28. A rectangle has all sides of integer length. When 3 units are added to the height and 2 units to the width, the area of the rectangle is tripled. What is the sum of the original areas of all such rectangles?
29. At Berracan station, northbound trains arrive every three minutes starting at noon and finishing at midnight, while southbound trains arrive every five minutes starting at noon and finishing at midnight. Each day, I walk to Berracan station at a random time in the afternoon and wait for the first train in either direction. On average, how many seconds should I expect to wait?

30. In a 14×18 rectangle $ABCD$, points P, Q, R and S are chosen, one on each side of $ABCD$ as pictured. The lengths $AP, PB, BQ, QC, CR, RD, DS$ and SA are all positive integers and $PQRS$ is a rectangle. What is the largest possible area that $PQRS$ could have?

