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Junior Division

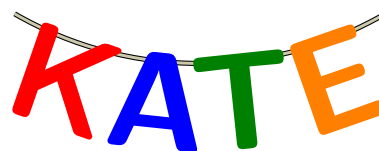
Questions 1 to 10, 3 marks each

1. What is $2 + 0 + 1 + 8$?
- (A) 9 (B) 10 (C) 11 (D) 38 (E) 2018
-

2. Callie has \$47 and then gets \$25 for her birthday. How much does she have now?
- (A) \$52 (B) \$62 (C) \$65 (D) \$69 (E) \$72
-

3. The value of $4 \times 10000 + 3 \times 1000 + 2 \times 10 + 4 \times 1$ is
- (A) 4324 (B) 43024 (C) 43204 (D) 430204 (E) 430024
-

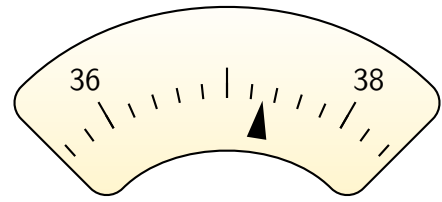
4. Kate made this necklace from alphabet beads. She put it on the wrong way around, showing the back of the beads. What does this look like?



- (A) (B) (C)
- (D) (E)
-

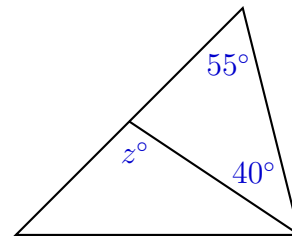
5. What is the time 58 minutes before 5.34 pm?
- (A) 5.32 pm (B) 5.36 pm (C) 6.32 pm (D) 6.12 pm (E) 4.36 pm
-

6. What value is indicated on this charisma-meter?
 (A) 36.65 (B) 37.65 (C) 38.65
 (D) 37.15 (E) 37.3



7. Starting at 1000, Ishrak counted backwards, taking 7 off each time. What was the last positive number he counted?
 (A) 2 (B) 3 (C) 4 (D) 5 (E) 6

8. What is the value of z ?
 (A) 75 (B) 85 (C) 95
 (D) 100 (E) 105



9. Five friends (Amelia, Billie, Charlie, David and Emily) are playing together and decide to line up from oldest to youngest.
- Amelia is older than Billie who is older than Emily.
 - David is also older than Billie.
 - Amelia is not the oldest.
 - Emily is not the youngest.

Who is the second-youngest of the five friends?

- (A) Amelia (B) Billie (C) Charlie (D) David (E) Emily

10. A length of ribbon is cut into two equal pieces. After using one piece, one-third of the other piece is used, leaving 12 cm of ribbon. How long, in centimetres, was the ribbon initially?

- (A) 24 (B) 32 (C) 36 (D) 48 (E) 50

Questions 11 to 20, 4 marks each

11. 1000% of a number is 100. What is the number?

- (A) 0.1 (B) 1 (C) 10 (D) 100 (E) 1000

12. Nora, Anne, Warren and Andrew bought plastic capital letters to spell each of their names on their birthday cakes. Their birthdays are on different dates, so they planned to reuse letters on different cakes.



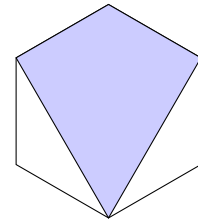
What is the smallest number of letters they needed?
 (A) 8 (B) 9 (C) 10 (D) 11 (E) 12

13. The cost of feeding four dogs for three days is \$60. Using the same food costs per dog per day, what would be the cost of feeding seven dogs for seven days?

(A) \$140 (B) \$200 (C) \$245 (D) \$350 (E) \$420

14. What fraction of this regular hexagon is shaded?

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



15. Leila has a number of identical square tiles that she puts together edge to edge in a single row, making a rectangle. The perimeter of this rectangle is three times that of a single tile. How many tiles does she have?

(A) 3 (B) 5 (C) 6 (D) 8 (E) 9

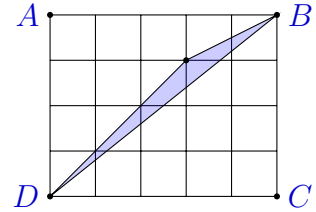
16. James is choosing his language electives for next year. He has to choose two different electives, one from Group A and one from Group B.

Group A	Group B
Mandarin	Mandarin
Japanese	German
Spanish	Arabic
Indonesian	Italian

How many different pairs of elective combinations are possible?

(A) 7 (B) 8 (C) 12 (D) 15 (E) 16

17. In the diagram, $ABCD$ is a $5\text{ cm} \times 4\text{ cm}$ rectangle and the grid has $1\text{ cm} \times 1\text{ cm}$ squares. What is the shaded area, in square centimetres?

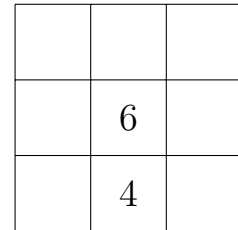


- (A) 1 (B) 1.5 (C) 0.5 (D) 2 (E) 3

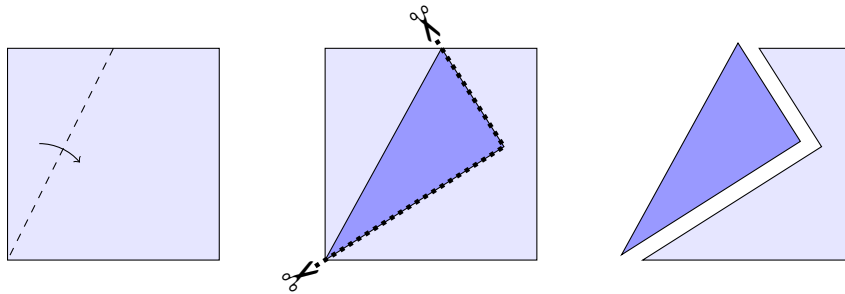
18. Fill in this diagram so that each of the rows, columns and diagonals adds to 18.

What is the sum of all the corner numbers?

- (A) 20 (B) 22 (C) 23
(D) 24 (E) 25



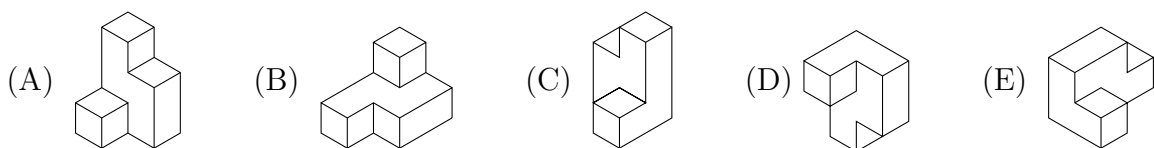
19. A square of paper is folded along a line that joins the midpoint of one side to a corner. The bottom layer of paper is then cut along the edges of the top layer as shown.



When the folded piece is unfolded, which of the following describes all the pieces of paper?

- (A) a kite and a pentagon of equal area
(B) a rectangle and a pentagon of equal area
(C) an isosceles triangle and a pentagon, with the pentagon of larger area
(D) a kite and a pentagon, with the kite smaller in area
(E) a rectangle and a pentagon, with the rectangle larger in area

20. A 3-dimensional object is formed by gluing six identical cubes together. Four of the diagrams below show this object viewed from different angles, but one diagram shows a different object. Which diagram shows the different object?



Questions 21 to 25, 5 marks each

21. Approximately how long is a *millimonth*, defined to be one-thousandth of a month?
 (A) 20 seconds (B) 70 seconds (C) 8 minutes (D) 40 minutes (E) 3 hours

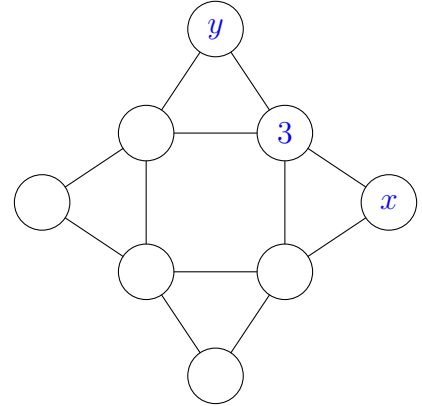
22. The numbers from 1 to 8 are entered into the eight circles in this diagram, with the number 3 placed as shown.

In each triangle, the sum of the three numbers is the same.

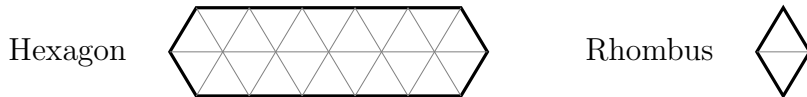
The sum of the four numbers which are at the corners of the central square is 20.

What is $x + y$?

- (A) 10 (B) 11 (C) 12 (D) 13 (E) 14



23. A long narrow hexagon is composed of 22 equilateral triangles of unit side length. In how many ways can this hexagon be tiled by 11 rhombuses of unit side length?



- (A) 6 (B) 8 (C) 9 (D) 12 (E) 16

24. In this expression

$$\square \frac{1}{3} \square \frac{1}{4} \square \frac{1}{5} \square \frac{1}{6} \square \frac{1}{7}$$

we place either a plus sign or a minus sign in each box so that the result is the smallest positive number possible. The result is

- (A) between 0 and $\frac{1}{100}$ (B) between $\frac{1}{100}$ and $\frac{1}{50}$
 (C) between $\frac{1}{50}$ and $\frac{1}{20}$ (D) between $\frac{1}{20}$ and $\frac{1}{10}$
 (E) between $\frac{1}{10}$ and 1

25. In this subtraction, the first number has 100 digits and the second number has 50 digits.

$$\underbrace{111 \dots 111}_{100 \text{ digits}} - \underbrace{222 \dots 222}_{50 \text{ digits}}$$

What is the sum of the digits in the result?

- (A) 375 (B) 420 (C) 429 (D) 450 (E) 475

For questions 26 to 30, shade the answer as an integer from 0 to 999
in the space provided on the answer sheet.

Questions 26–30 are worth 6, 7, 8, 9 and 10 marks, respectively.

26. Using only digits 0, 1 and 2, this cube has a different number on each face.

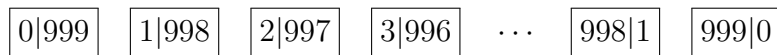
Numbers on each pair of opposite faces add to the same 3-digit total.

What is the largest that this total could be?



27. I have a three-digit number, and I add its digits to create its *digit sum*. When the digit sum of my number is subtracted from my number, the result is the square of the digit sum. What is my three-digit number?

28. A road from Tamworth to Broken Hill is 999 km long. There are road signs each kilometre along the road that show the distances (in kilometres) to both towns as shown in the diagram.



How many road signs are there that use exactly two different digits?

29. In the multiplication shown, X , Y and Z are different non-zero digits.

$$\begin{array}{r}
 X \ Y \ Z \\
 \times \quad 1 \ 8 \\
 \hline
 Z \ X \ Y \ Y
 \end{array}$$

What is the three-digit number XYZ ?

30. Let A be a 2018-digit number which is divisible by 9. Let B be the sum of all digits of A and C be the sum of all digits of B . Find the sum of all possible values of C .
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