



# Singapore Math Kangaroo Contest 2018

## Secondary 2 / Grade 8 Contest Paper

Name: \_\_\_\_\_

School: \_\_\_\_\_

### INSTRUCTIONS:

1. Please **DO NOT OPEN** the contest booklet until the Proctor has given permission to start.
2. **Duration: 1 hour and 30 minutes**
3. There are 30 questions in this paper. Each question scores 3 points in Section A, 4 points in Section B and 5 points in Section C. No points are deducted for Unanswered question. 1 point is deducted for Wrong answer.
4. Shade your answers neatly in the answer entry sheet.
5. PROCTORING: No help should be given to any student in any way during the contest.
6. **No calculators** are allowed.
7. All students must fill and shade in your **Name, Index number, Level and School** in the Answer sheet provided.
8. Students are not allowed to leave the venue within the first hour of the contest and 15 minutes before the end of the contest.
9. Students must show detailed working and transfer their answers to the answer entry sheet.
10. No spare papers can be used in writing this contest. Enough space is provided for your working of each question.
11. Students are not allowed take any answer script, reference materials and contest paper out of the venue.

# **Rough Working**

**Section A** (Correct – 3 points | Unanswered – 0 points | Wrong – deduct 1 point)

**Question 1**

What is the value of  $(20 + 18) : (20 - 18)$ ?

- (A) 18                      (B) 19                      (C) 20                      (D) 34                      (E) 36

**Question 2**

When the letters of the word MAMA are written vertically above one another, the word has a vertical line of symmetry. Which of the words below also have a vertical line of symmetry when written in the same way?



- (A) ROOT                      (B) BOOM                      (C) BOOT                      (D) LOOT                      (E) TOOT

**Question 3**

A triangle has sides of length 6, 10 and 11. An equilateral triangle has the same perimeter. What is the length of each side of the equilateral triangle?

- (A) 6                      (B) 9                      (C) 10                      (D) 11                      (E) 27

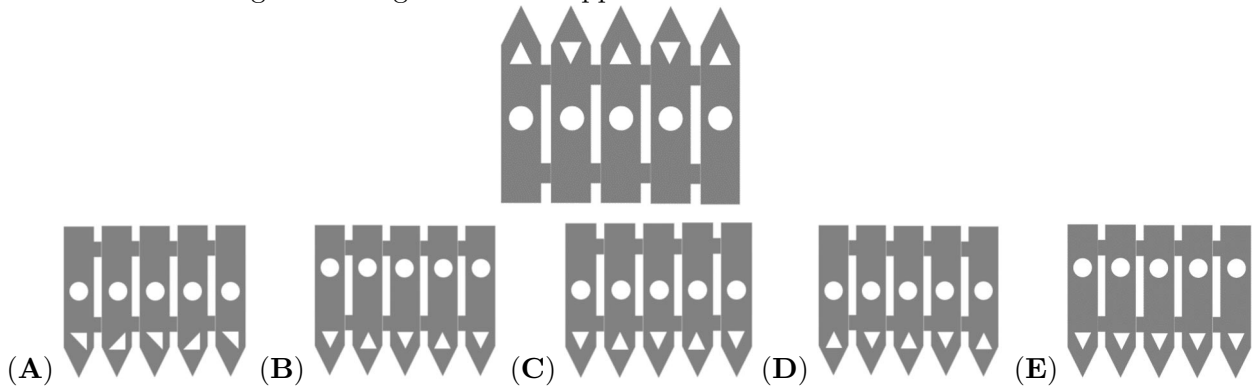
**Question 4**

Which number should replace  $*$  in the equation  $2 \times 18 \times 14 = 6 \times * \times 7$  to make it correct?

- (A) 8                      (B) 9                      (C) 10                      (D) 12                      (E) 15

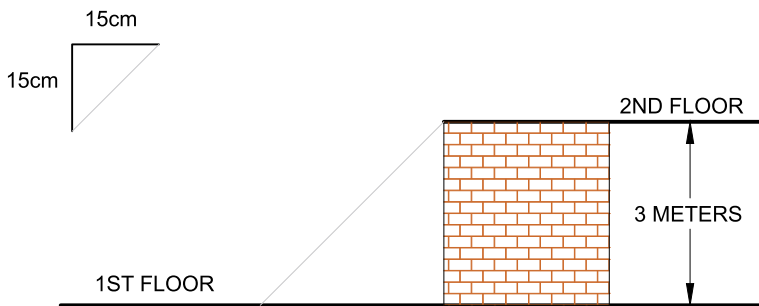
**Question 5**

The panels of Fergus' fence are full of holes. One morning, one of the panels fell flat on the floor. Which of the following could Fergus see as he approaches his fence?



**Question 6**

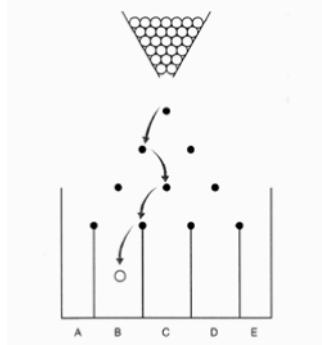
Bertie the Builder is assembling stairs which are 15 cm tall and 15 cm deep, as shown in the diagram. How many stairs does he need to reach the second floor of a building 3 m above the first floor?



- (A) 8                      (B) 10                      (C) 15                      (D) 20                      (E) 25

**Question 7**

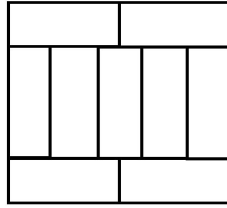
A game consists of dropping a ball from the top of the board with interleaved rows of pins. The ball bounces to either the right or to the left each time it hits a pin. One possible route for the ball to take is shown below. How many different routes could the ball take to reach bin B?



- (A) 2                      (B) 3                      (C) 4                      (D) 5                      (E) 6

**Question 8**

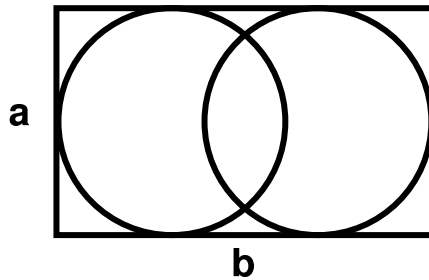
A large rectangle is made up of nine identical rectangles whose longest sides are 10 cm long. What is the perimeter of the large rectangle?



- (A) 40 cm      (B) 48 cm      (C) 76 cm      (D) 81 cm      (E) 90 cm

**Question 9**

The diagram shows a rectangle of dimensions  $7 \times 11$  containing two circles that each touch three of the sides of the rectangle. If  $a = 7$  and  $b = 11$ , what is the distance between the centres of the two circles?

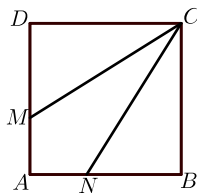


Note: Replace  $a$  by 7 and  $b$  by 11 on the diagram

- (A) 1      (B) 2      (C) 3      (D) 4      (E) 5

**Question 10**

Square  $ABCD$  has sides of length 3 cm. The points  $M$  and  $N$  lie on  $AD$  and  $AB$  so that  $CM$  and  $CN$  split the square into three pieces of the same area. What is the length of  $DM$ ?



- (A) 0.5 cm      (B) 1 cm      (C) 1.5 cm      (D) 2 cm      (E) 2.5 cm

**Section B** (Correct – 4 points | Unanswered – 0 points | Wrong – deduct 1 point)

**Question 11**

Martha multiplied two 2-digit numbers correctly on a piece of paper. Then she scribbled out three digits as shown. What is the sum of the three digits she scribbled out?



- (A) 5      (B) 6      (C) 9      (D) 12      (E) 14

**Question 12**

A rectangle is divided into 40 identical squares. The rectangle contains more than one row of squares. Andrew coloured the squares in the middle row. How many squares were not coloured by Andrew?

- (A) 20                      (B) 30                      (C) 32                      (D) 35                      (E) 39

**Question 13**

Philip’s weighing scale has an error of  $\pm 10$  grams. What is the smallest number of identical copies of a book that Philip should weigh together so that the error of one book will be  $\pm 0.5$  grams?

- (A) 5                      (B) 10                      (C) 15                      (D) 20                      (E) 50

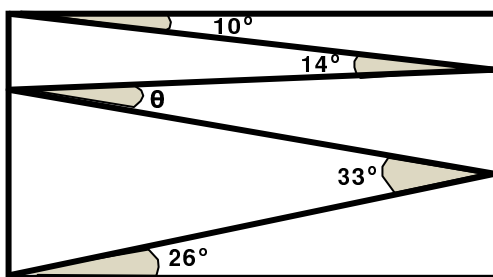
**Question 14**

A lion is hidden in one of three rooms. A note pasted on the door at room 1 reads "The lion is here". A note pasted on the door at room 2 reads "The lion is not here". A note pasted on the door at room 3 reads " $2 + 3 = 2 \times 3$ ". Only one of these sentences is true. Which room is the lion hiding?

- (A) In room 1.                      (B) In room 2.                      (C) In room 3.  
 (D) It may be in any room.                      (E) It may be in either room 1 or room 2.

**Question 15**

Valeriu draws a zig-zag line inside a rectangle, creating angles of  $10^\circ$ ,  $14^\circ$ ,  $33^\circ$ , and  $26^\circ$  as shown in the diagram below. What is the size of angle  $\theta$ ?



- (A)  $11^\circ$                       (B)  $12^\circ$                       (C)  $16^\circ$                       (D)  $17^\circ$                       (E)  $33^\circ$

**Question 16**

Alice wants to write down a list of prime numbers less than 100, using each of the digits 1, 2, 3, 4 and 5 exactly once and no other digits. Which prime number will appear in her list?

- (A) 2                      (B) 5                      (C) 31                      (D) 41                      (E) 53

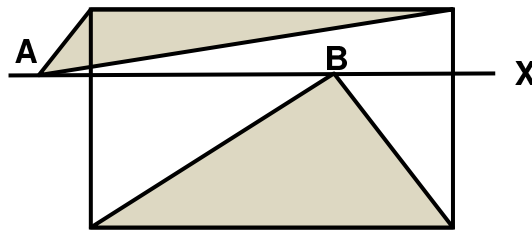
**Question 17**

A hotel on an island in the Caribbean advertises using the slogan "350 days of sun every year!". According to the advert, what is the smallest number of days Willi Burn has to stay at the hotel in 2018 to be certain of having two consecutive days of sun?

- (A) 17                      (B) 21                      (C) 31                      (D) 32                      (E) 35

**Question 18**

The diagram below shows a rectangle and a line  $X$  parallel to the base of the rectangle. Two points  $A$  and  $B$  lie on  $X$ . The sum of the areas of the two shaded triangles is  $10 \text{ cm}^2$ . What is the area of the rectangle?



- (A)  $18 \text{ cm}^2$                       (B)  $20 \text{ cm}^2$                       (C)  $22 \text{ cm}^2$   
 (D)  $24 \text{ cm}^2$                       (E) It depends on the positions of  $A$  and  $B$

**Question 19**

James wrote a different integer from 1 to 9 in each cell of a  $3 \times 3$  table. He calculated the sum of the integers in each of the rows and in each of the columns of the table. Five of his answers are 12, 13, 15, 16 and 17, in some order. What is his sixth answer?


- (A) 17                      (B) 16                      (C) 15                      (D) 14                      (E) 13

**Question 20**

Eleven points are marked from left to right on a straight line. The sum of all the distances between the first point and the other points is 2018. The sum of all the distances between the second point and the other points, including the first one, is 2000. What is the distance between the first point and the second point?

- (A) 1                      (B) 2                      (C) 3                      (D) 4                      (E) 5

**Section C** (Correct – 5 points | Unanswered – 0 points | Wrong – deduct 1 point)

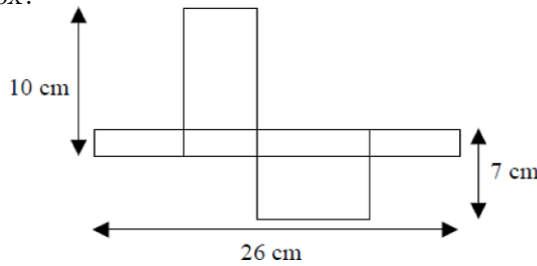
**Question 21**

There are three candidates for one position as class monitor and 130 students are voting. Suhaimi has 24 votes so far, while Khairul has 29 and Akmal has 37. How many more votes does Akmal need in order to be elected?

- (A) 13                      (B) 14                      (C) 15                      (D) 16                      (E) 17

**Question 22**

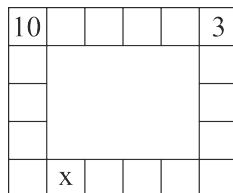
The diagram shows a net of an unfolded rectangular box. What is the volume of the box?



- (A)  $43 \text{ cm}^3$                       (B)  $70 \text{ cm}^3$                       (C)  $80 \text{ cm}^3$                       (D)  $100 \text{ cm}^3$                       (E)  $1820 \text{ cm}^3$

**Question 23**

The number in each square is equal to the sum of two numbers in the neighbouring square. Two of the numbers are given in the diagram as shown below. What number should be written in the square marked X?

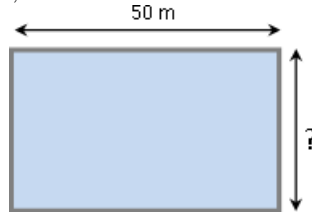


- (A) 10                      (B) 7                      (C) 13                      (D) -13                      (E) -3



**Question 24**

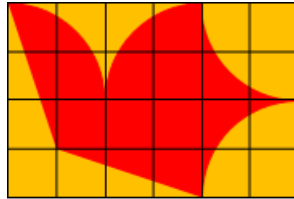
Simon and Ian decide to have a race. Simon will run around the perimeter of the pool while Ian will swim multiple laps in the pool. A single lap in a pool is 50m long. The time taken for Ian to swim six laps of the pool is equal to the time taken for Simon to run around the pool five times. If Simon runs three times faster than Ian swims, what is the width of the pool?



- (A) 25 m      (B) 40 m      (C) 50 m      (D) 80 m      (E) 180 m

**Question 25**

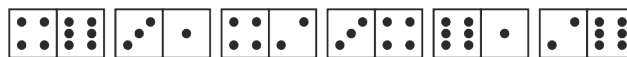
Freda's flying club designed a flag of a flying dove on a square grid as shown. The area of the dove is  $192 \text{ cm}^2$ . All parts of the perimeter of the dove are either parts of a circle or straight lines. What are the dimensions of the flag?



- (A) 6 cm x 4 cm    (B) 12 cm x 8 cm    (C) 20 cm x 12 cm    (D) 24 cm x 16 cm    (E) 30 cm x 20 cm

**Question 26**

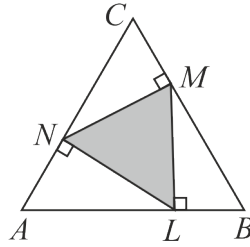
Domino tiles are said to be arranged correctly if the number of spots at the ends must be equal to the number of spots of the neighbouring dominoes. Paulius laid six dominoes in a line as shown in the diagram. He can make a move by either swapping the position of any two dominoes or by rotating one domino. What is the smallest number of moves he needs to make to arrange all the 6 dominoes correctly?



- (A) 1      (B) 2      (C) 3      (D) 4  
 (E) It is impossible to do

**Question 27**

Points N, M and L lie on the sides of the equilateral triangle ABC, such that  $NM \perp BC$ ,  $ML \perp AB$  and  $LN \perp AC$  as shown in the diagram below. The area of triangle ABC is  $36 \text{ cm}^2$ . What is the area of triangle LMN?



- (A) 9                      (B) 12                      (C) 15                      (D) 16                      (E) 18

**Question 28**

Azmi, Burhan and Choo went shopping. Burhan spent only 15 % of what Choo spent. However, Azmi spent 60 % more than Choo. They spent 55 dollars altogether. How much did Azmi spend?

- (A) 3                      (B) 20                      (C) 25                      (D) 26                      (E) 32

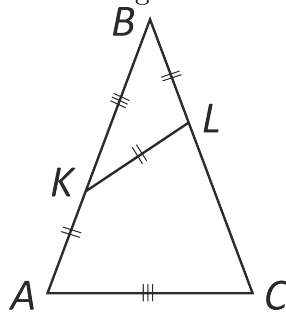
**Question 29**

Viola is practising the long jump. The average distance she has jumped so far today is 3.80 m. On her next jump, she jumped 3.99 m and her average distance increased to 3.81 m. How far must she jump in her subsequent jump such that the her average distance increases to 3.82 m

- (A) 3.97 m                      (B) 4.00 m                      (C) 4.01 m                      (D) 4.03 m                      (E) 4.04 m

**Question 30**

In isosceles triangle ABC, points K and L are marked on sides AB and BC respectively so that  $AK = KL = LB$  and  $KB = AC$ . What is the angle ABC?



- (A)  $30^\circ$                       (B)  $35^\circ$                       (C)  $36^\circ$                       (D)  $40^\circ$                       (E)  $44^\circ$

# **Rough Working**

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