Surname _____

Name _____

Father's Name _____

THE G C SCHOOL OF CAREERS
MATHEMATICS SCHOOL

MATHEMATICS APTITUDE TEST
2019-2020

TIME: 1 HOUR 30 MINUTES

- The paper consists of **two parts**.
- The first part consists of **15 multiple choice questions**.
- The second part consists of **15 math problem questions**.
- **Calculators** are **NOT** allowed for this examination.
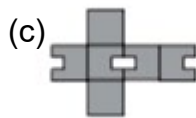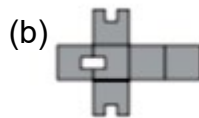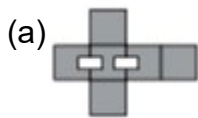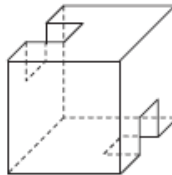
Good Luck!

PART A – MULTIPLE CHOICE QUESTIONS

- **This part consists of 15 questions.**
- **Answer ALL questions in the space provided.**
- **There is only one correct answer to each question.**
- **Circle the correct answer.**
- **Each question is 3 marks.**

45 marks

1. Which of the following nets can be used to build the partial cube shown in the diagram?

(a) (b) (c) (d) (e)
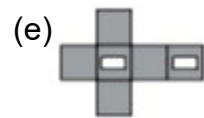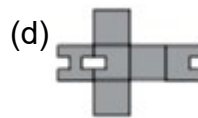
2. When Maria went to the shop, she found she could spend all her money on 6 cans of cola and 7 croissants or on 8 cans of cola and 4 croissants. If she decided to buy only croissants, how many croissants could she buy?

(a) 12 (b) 13 (c) 15 (d) 16 (e) 25

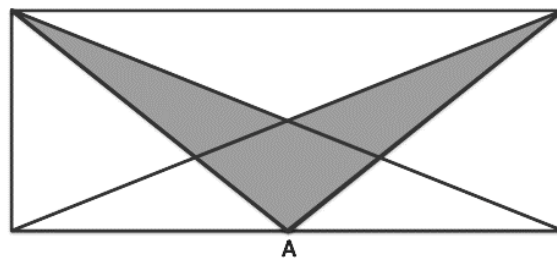**3.** All numbers from 1 to 31 are multiplied together. How many zeros are there at the end of the result?

(a) 3   (b) 5   (c) 6   (d) 7   (e) 8

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4. What fraction of the rectangle is shaded if A is the midpoint of the bottom side?

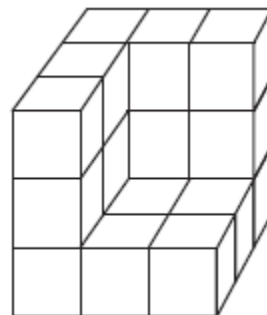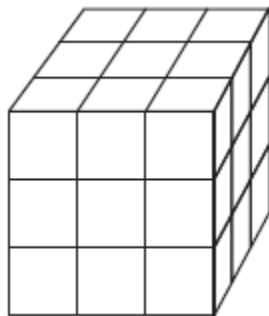(a) $\dfrac{1}{6}$ (b) $\dfrac{1}{5}$ (c) $\dfrac{1}{4}$ (d) $\dfrac{1}{3}$ (e) $\dfrac{1}{2}$

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5. It takes 9 litres of paint to cover the surface of the cube on the left.

How much paint would it take to cover the surface of the shape on the right?

(a) 4 litres   (b) 9 litres   (c) 8 litres   (d) 6 litres   (e) 2 litres

6. If you know that $3B = 2A$, find the value of:

$$\frac{4A - B}{4A + B}$$

(a) $\dfrac{3}{5}$ (b) $\dfrac{5}{7}$ (c) $\dfrac{11}{13}$ (d) $\dfrac{5}{11}$ (e) 1

**7.** In the sum shown, different shapes represent different digits.

What digit does the square represent?

(a) 2 (b) 4 (c) 6 (d) 8 (e) 9

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8. In the sequence of letters MATHEMATICSMATHEMATICSMATHEMATICS… the word MATHEMATICS is repeated. What is the 2017th letter in this sequence?

(a) M (b) H (c) T (d) S (e) A

9. The line *PQ* is divided into six parts by the points *V*, *W*, *X*, *Y* and *Z*. Squares are drawn on *PV*, *VW*, *WX*, *XY*, *YZ* and *ZQ* as shown in the diagram. The length of the line is 24 cm. What is the length of the path from P to Q indicated by the arrows?
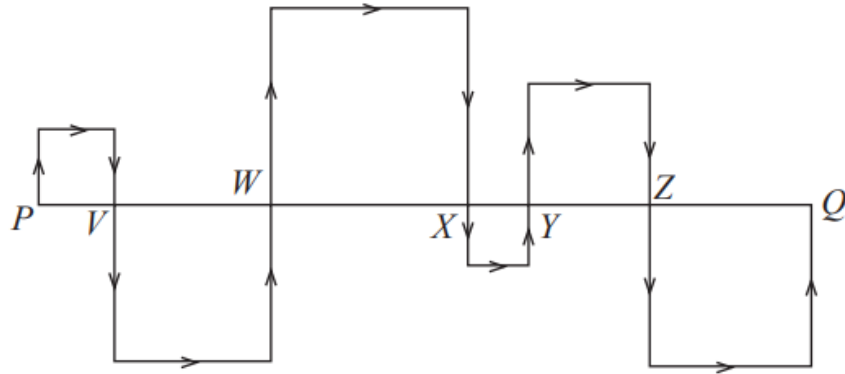
(a) 48cm   (b) 60cm   (c) 66cm   (d) 72cm   (e) 96cm

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10. In the six-digit number $1AB\Gamma\Delta E$, each letter represents a digit. Given that

$$1AB\Gamma\Delta E \times 3 = AB\Gamma\Delta E1$$
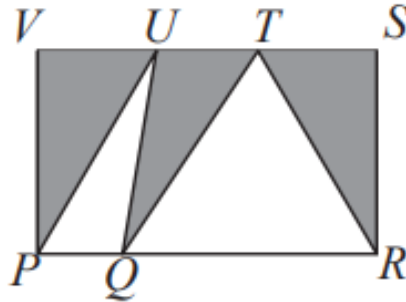
the value of $A + B + \Gamma + \Delta + E$ is:

(a) 30   (b) 29   (c) 28   (d) 26   (e) 22

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11. Starting with number 2 and adding 9 you get the sequence 2,11,20,29…
Which of the following numbers will not be included in the above sequence?

(a) 992   (b) 1001   (c) 1028   (d) 1039   (e) 1055

12. In the diagram, *PRSV* is a rectangle with *PR* = 20 cm and *PV* = 12 cm. Jeffrey marks points U and T on VS and Q on PR as shown. What is the shaded area?

(a) More information needed

(b) 60 cm^2

(c) 100 cm^2

(d) 110 cm^2

(e) 120 cm^2

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13. In the triangle *PQR*, the length of sides *PQ* and *PR* are the same. The point *S* lies on *QR* so that *QS* = *PS* and angle *RPS* = 75°. What is the size of angle *QRP*?
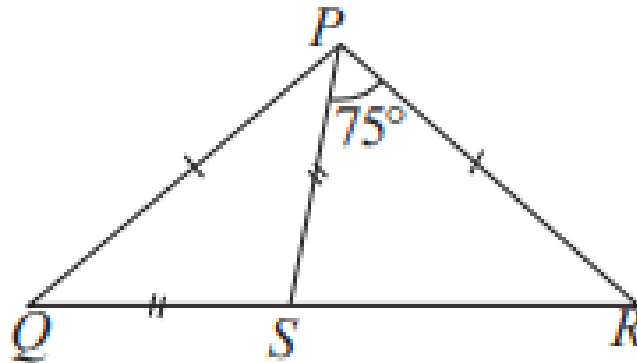
(a) 35°   (b) 30°   (c) 25°   (d) 20°   (e) 45°

14. A hammer and a nail cost £21.
If the hammer costs £20 more than the nail, how many times is the hammer more expensive than the nail?

(a) 20   (b) 21   (c) 40   (d) 41   (e) 50

15. The mean score of the students who took a mathematics test was 6. Exactly 60% of the students passed the test. The mean score of the students who passed the test was 8. What was the mean score of the students who failed the test?

(a) 1   (b) 2   (c) 3   (d) 4   (e) 5

END OF PART A
YOU CAN CONTINUE WITH PART B

PART B – PROBLEMS

- **Answer ALL questions.**
- **Show clearly your workings.**
- **If you have difficulties in any question, put a star next to the question number and continue with the next one. If you have time at the end, go back and try again.**

55 marks

1. Find the value of the following:

   a) $\dfrac{96+97}{96\times97}+\dfrac{98+99}{98\times99}-\dfrac{1}{96}-\dfrac{1}{97}-\dfrac{1}{98}=$

   (3 marks)

   b) $1-2+3-4+5-6+\cdots+2011-2012+2013=$

   (2 marks)

2. A box contains beads and coins. Both of these items are either gold or silver. 20% of all items included in the box are beads and 40% are silver beads. Find the percentage of gold coins.

   (3 marks)

3. Sarah, Maria, Helen and Tonia answered 3 different questions (A, B, C) in a test. Each question is worth different marks.
The table below gives the percentage mark gained for each question, along with the total marks gained in the test.

	A	B	C	Marks
Sarah	0%	75%	100%	27
Maria	100%	100%	100%	50
Helen	60%	100%	50%	
Tonia	100%	0%	100%	38

a) Work out the individual marks worth for each question.

(3 marks)

b) How many marks did Helen gain?

(2 marks)

4. Peter has a lock with a three-digit code. He knows that all the digits of his code are different and that if he divides the second digit by the third and then squares his answer, he will get the first digit. What is the difference between the largest and the smallest possible codes?
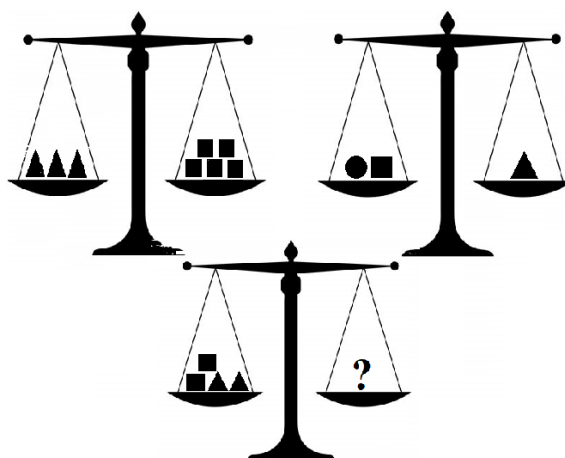
(3 marks)

5. When a barrel is 40% empty, it contains 28 litres more oil than when it is 20% full. What is the capacity in litres of oil for the barrel to be full?

(3 marks)

6. Examine the following sets of scales, which are in perfect balance. How many **balls** are needed to balance the final scale?

(4 marks)

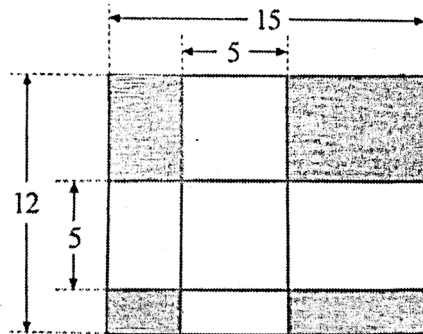**7.** The following operation is defined as:

$$\chi @ \psi = \frac{2 \cdot \chi \cdot \psi^2 - \chi^2 \cdot \psi \cdot 1^{2019}}{3}$$

Find the value of 4 @ 3.

(3 marks)

8. Find the total area of the shaded region.

(4 marks)

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9. A rectangle has an area 84 cm^2. When the height of the rectangle is increased by 2 cm and the length decreased by 3 cm, a square is formed. What is the area of the square?

(3 marks)

10. There is a number of Minions in a room. Each Minion has either got one eye or two eyes. In the room, there are three times as many Minions with two eyes as there are with one eye. In total there are 329 eyes in the room. How many Minions in the room have two eyes?

(4 marks)

11. Nicos's age two years ago was a multiple of 6. His age last year was a multiple of 5. Given that he is younger than 40 years old, find Nicos's age.

(3 marks)

12. Katerina is arranging the books on her bookshelves. She puts half her book on the bottom shelf and the $\frac{2}{3}$ of what remains on the second shelf. Finally she splits the rest of her books over the other two shelves so that the third shelf contains four more books than the top shelf. There are three books on the top shelf. How many books are there on the bottom shelf?

(3 marks)

13. A solar charger charges a battery. The battery is charged during day light by $\frac{1}{2}$ and emptied over night by $\frac{1}{3}$. Given that the battery is fully empty on Monday morning (before sunrise), find the day on which the battery will be fully charged.

(4 marks)

14. From the integers 1 to 100, all the multiples of 2, 3 and 4 are removed. How many of the original one hundred integers remain?

(4 marks)

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15. Anna has six coins. The largest amount she is able to make with five of the coins is €4.60. The smallest amount she is able to make with five of the coins is €2.70. What is the total value of Anna's six coins?

(4 marks)

END

TOTAL MARKS 100