Numbers – 2023 IGCSE 0580

1. March/2023/Paper_0580/12/No.1

Write the number twenty-five million in figures.

..... [1]

2. March/2023/Paper_0580/12/No.2

(a) Write 0.7 as a fraction.

..... [1]

(b) Write $\frac{13}{20}$ as a percentage.

..... % [1]

3. March/2023/Paper_0580/12/No.3

$-7 \quad 12 \quad -3 \quad 2 \quad 8 \quad -6 \quad 15 \quad -4 \quad -8$

From the list of numbers, find

(a) all the numbers which are less than -5

..... [1]

(b) the product of the largest number and the smallest number.

..... [1]

4. March/2023/Paper_0580/12/No.4

An exam starts at 11 50 and lasts for $2\frac{1}{4}$ hours.

Work out the time that the exam finishes.

..... [1]

5. March/2023/Paper_0580/12/No.5

Write 56.17345 correct to 1 decimal place.

..... [1]

6. March/2023/Paper_0580/12/No.6

Work out the number of seconds in 5 hours.

.....s [2]

12	15	27	29	91	93

From the list of numbers, write down

(a) a cube number

..... [1]

(b) a prime number.

..... [1]

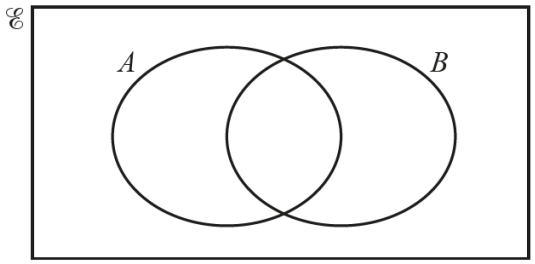
8. March/2023/Paper_0580/12/No.9

A suit costs 6500 rupees.

Calculate the cost of the suit in dollars when the exchange rate is 1 rupee = \$0.013 .

\$ ..... [1]

9. March/2023/Paper_0580/12/No.13// March/2023/Paper_0580/22/No.3



On the Venn diagram, shade the region $A \cap B$. [1]

10. March/2023/Paper_0580/12/No.16// March/2023/Paper_0580/22/No.6

Without using a calculator, work out $\frac{4}{7} \div 8$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [2]

11. March/2023/Paper_0580/12/No.18

The mass, m kg, of a bag of sand is 12 kg, correct to the nearest kilogram.

Complete the statement about the value of m.

..... $\leqslant m <$ ..... [2]

12. March/2023/Paper_0580/12/No.19

Qianna invests $3000 at a rate of 4% per year compound interest.

Calculate the value of her investment at the end of 6 years.

$ ..... [2]

13. March/2023/Paper_0580/12/No.21// March/2023/Paper_0580/22/No.8

Calculate 0.3^2 .
Give your answer in standard form.

..... [2]

14. March/2023/Paper_0580/22/No.4

23, 17, 11, 5, ...

(a) Write down the next number in this sequence.

..... [1]

(b) Find the nth term of this sequence.

..... [2]

15. March/2023/Paper_0580/22/No.11

Find the highest common factor (HCF) of $12x^{12}$ and $16x^{16}$.

..... [2]

16. March/2023/Paper_0580/22/No.16

y is inversely proportional to x^2.
When $x = 3$, $y = 2$.

Find y when $x = 2$.

$y =$ ..... [3]

17. March/2023/Paper_0580/22/No.20

Find the nth term of each sequence.

(a) –1, 0, 7, 26, 63, …

..... [2]

(b) 24, 12, 6, 3, 1.5, …

..... [2]

18. March/2023/Paper_0580/22/No.21

A car travels 14 km, correct to the nearest kilometre.
This takes 12 minutes, correct to the nearest minute.

Calculate the lower bound of the speed of the car.
Give your answer in kilometres per minute.

..... km/min [3]

19. March/2023/Paper_0580/32/No.1

(a) The table shows some information about the opening hours of a café.
The café opens 4 days a week.

Day	Opening time	Closing time	Number of hours open
Thursday	8 am	4.30 pm	
Friday	8.30 am		$7\frac{1}{2}$
Saturday	9.30 am	5.30 pm	8
Sunday		3.30 pm	5
		Total number of hours open	29

Complete the table. [3]

(b) **(i)** A waiter works 29 hours a week in the café.
He is paid $9.50 per hour.
He is paid for 52 weeks of the year.

Work out his total pay for the year.

$ ..... [2]

(ii) The chef is paid 32% more than the waiter per hour.

Work out how much the chef is paid per hour.

$ ..... [2]

(c) Here is part of the café's menu.

MENU

Cup of coffee	$2.50	Slice of pizza	$3.70
Cup of tea	$2.30		

Raj buys 2 cups of coffee, 1 cup of tea and 3 slices of pizza.

Calculate the change he receives from $20.

$ ..... [3]

(d) The chef records the types of baguettes the café sells in one day.

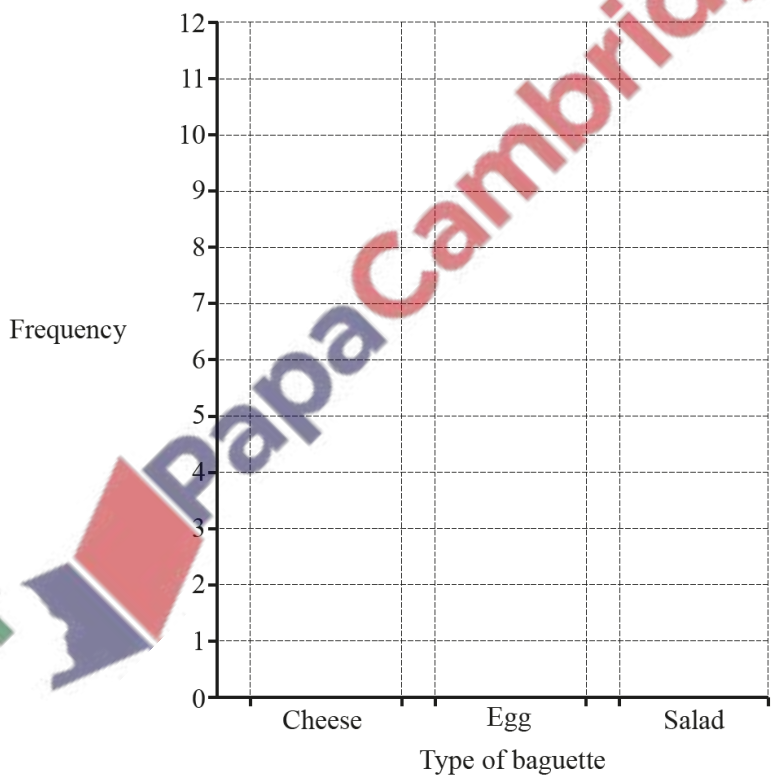
salad	cheese	salad	salad	egg	cheese	cheese	salad	cheese	egg	salad
cheese	salad	salad	egg	cheese	salad	salad	egg	salad	cheese	salad

(i) Complete the frequency table to show this information.
You may use the tally column to help you.

Type of baguette	Tally	Frequency
Cheese		
Egg		
Salad		

[2]

(ii) On the grid, draw a bar chart to show this information.



[2]

20. March/2023/Paper_0580/32/No.3

(a) A recipe for making 20 biscuits uses 150 g flour, 125 g butter and 50 g sugar.

(i) Write the ratio flour : butter : sugar in its simplest form.

flour : butter : sugar = ... : ..... : ..... [2]

(ii) Work out the amount of flour, butter and sugar needed to make 50 biscuits.

flour ..... g

butter ..... g

sugar ..... g [3]

(b) **(i)** A recipe for making one loaf of bread uses 600 g of flour.
A sack of flour contains 16 kg of flour.

Complete the statements.

One sack of flour makes a maximum of ..... loaves of bread.

The amount of flour left over is ..... g.

[4]

(ii) The amount of flour in a sack decreases from 16 kg to 15 kg.

Work out the percentage decrease of flour in the sack.

..... % [2]

21. March/2023/Paper_0580/32/No.4

(a) Write 6479 correct to the nearest 100.

..... [1]

(b) Write down the multiple of 13 that is between 100 and 110.

..... [1]

(c) Find the reciprocal of 0.6 .

..... [1]

(d) Work out.

$3+4\times2$

..... [1]

(e) Write down an irrational number with a value between 15 and 20.

..... [1]

(f) By writing each number in the calculation correct to 1 significant figure, find an estimate for the value of

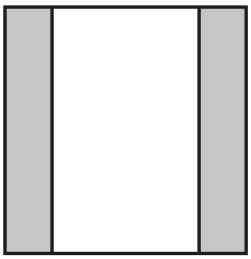
$$\frac{423.8-78.4}{23.5}.$$

You must show all your working.

..... [2]

22. March/2023/Paper_0580/32/No.8

(a)



(i) Write down the order of rotational symmetry of the diagram.

..... [1]

(ii) On the diagram, draw all the lines of symmetry. [2]

(b) The grid shows the first three diagrams in a sequence.
Each diagram is made using small grey and small white squares to make grey and white columns.

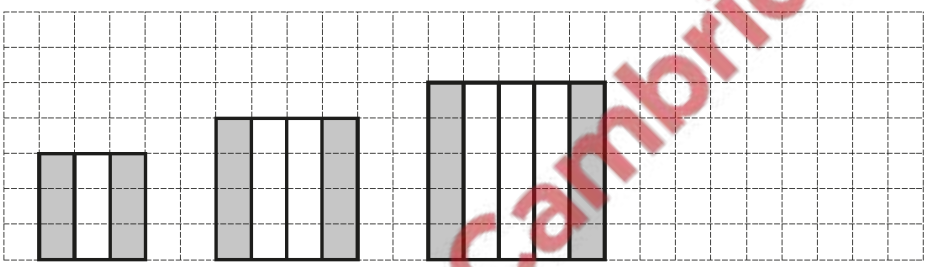


Diagram 1 Diagram 2 Diagram 3 Diagram 4

(i) On the grid, draw Diagram 4. [1]

(ii) **(a)** Complete this statement.

Diagram n has ..... grey columns. [1]

(b) Find an expression, in terms of n, for the total number of columns in Diagram n.

..... [2]

(c) Find an expression, in terms of n, for the fraction of columns that are grey in Diagram n.

..... [1]

(iii)

Diagram number	1	2	3	4	5
Number of grey squares	6	8	10		
Number of white squares	3	8	15		
Total number of squares	9	16	25		

(a) Complete the table. [3]

(b) Write an expression, in terms of n, for the number of grey squares in Diagram n.

..... [2]

(c) The number of white squares in Diagram n is $n(n+2)$.

Work out the number of white squares in Diagram 30.

..... [2]

(d) Diagram k has a **total** of 1296 squares.

Work out the value of k.

$k =$ ..... [2]

23. March/2023/Paper_0580/42/No.1

(a) **(i)** Alain and Beatrice share \$750 in the ratio Alain : Beatrice = 8 : 7.

Show that Alain receives \$400.

[1]

(ii) **(a)** Alain spends \$150.

Write \$150 as a percentage of \$400.

..... % [1]

(b) He invests the remaining \$250 at a rate of 2% per year simple interest.

Calculate the amount Alain has at the end of 5 years.

\$ ..... [3]

(iii) Beatrice invests her \$350 at a rate of 0.25% per **month** compound interest.

Calculate the amount Beatrice has at the end of 5 years.
Give your answer correct to the nearest dollar.

\$ ..... [3]

(b) Carl, Dina and Eva share 100 oranges.
The ratio Carl's oranges : Dina's oranges = 3 : 5.
The ratio Carl's oranges : Eva's oranges = 2 : 3.

Find the number of oranges Carl receives.

..... [2]

(c) Fred buys a house.
At the end of the first year, the value of the house increases by 5%.
At the end of the second year, the value of the house increases by 3% of its value at the end of the first year.
The value of Fred's house at the end of the second year is \$60 564.

Calculate how much Fred paid for the house.

\$ ..... [3]

(d) Gabrielle invests \$500 at a rate of r% per year compound interest.
At the end of 8 years the value of Gabrielle's investment is \$609.20 .

Find the value of r.

r = ... [3]

24. June/2023/Paper_0580/11/No.1

Work out the number of months in 5 years.

..... months [1]

25. June/2023/Paper_0580/11/No.2

Write 3752 correct to the

(a) nearest 10

..... [1]

(b) nearest 100.

..... [1]

26. June/2023/Paper_0580/11/No.3

Magazines cost $3.40 each.
Rosina has $15 to buy as many magazines as possible.

Complete the statement.

Rosina can buy ..... magazines and will have $ ..... left. [3]

27. June/2023/Paper_0580/11/No.6

A train journey starts at 21 43.
It takes 8 hours and 32 minutes.

Find the time the journey finishes.

..... [1]

28. June/2023/Paper_0580/11/No.7

Write these numbers in order, starting with the smallest.

$\frac{15}{213}$ 0.071 0.7 7%

..... < ..... < ..... < ..... [2]

smallest

29. June/2023/Paper_0580/11/No.8

Write the fraction $\frac{24}{84}$ in its simplest form.

..... [1]

30. June/2023/Paper_0580/11/No.14

By writing each number in the calculation correct to 1 significant figure, work out an estimate for the value of

$$\frac{6.7 \times 2.1}{18 - 5.9}.$$

You must show all your working.

..... [2]

31. June/2023/Paper_0580/11/No.17

(a) The nth term of a sequence is $10 - n^2$.

Write down the first three terms of this sequence.

..... , ... , ... [2]

(b) These are the first four terms of another sequence.

7 10 13 16

Find an expression for the nth term of this sequence.

..... [2]

32. June/2023/Paper_0580/11/No.18

The length, l metres, of a piece of wood is 3.6 metres, correct to the nearest 10 centimetres.

Complete this statement about the value of l.

..... $\leqslant l <$ ..... [2]

33. June/2023/Paper_0580/11/No.19

Calculate $1 \div (6.4 \times 10^{-5})$.
Give your answer in standard form.

..... [2]

34. June/2023/Paper_0580/11/No.20

Without using a calculator, work out $2\frac{1}{7} \div \frac{5}{9}$.

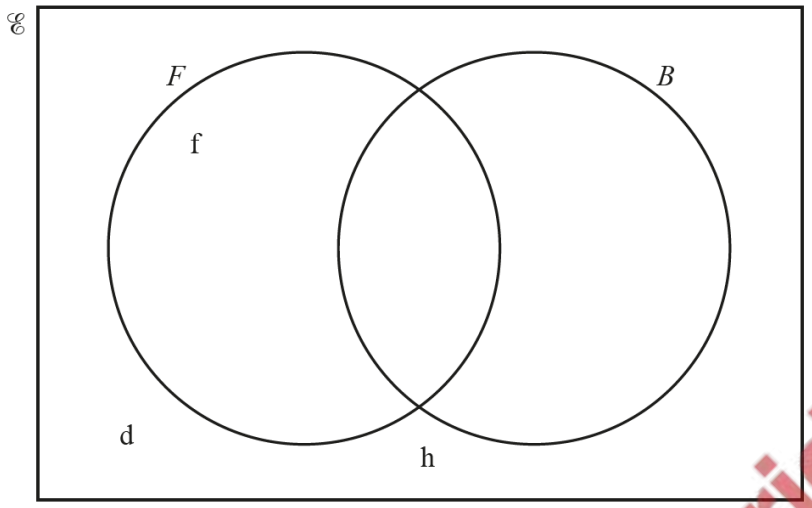
You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

35. June/2023/Paper_0580/11/No.24

$\mathscr{E}$ = {a, b, c, d, e, f, g, h, i, j, k}
F = {f, a, c, e}
B = {b, a, c, k}

(a) Complete the Venn diagram.



[2]

(b) Find n($F \cup B$).

..... [1]

36. June/2023/Paper_0580/12/No.1

(a) Write down all the factors of 18.

..... [2]

(b) Write down the reciprocal of 8.

..... [1]

37. June/2023/Paper_0580/12/No.4

Kai and Ava each have a piece of wood 57 cm long.

(a) Kai cuts his piece into 4 equal length parts.

Find the length of one part.

.....cm [1]

(b) Ava cuts her piece into two parts and the lengths are in the ratio 5 : 1.

Find the length of the longer part.

.....cm [2]

38. June/2023/Paper_0580/12/No.6

Find the temperature that is 8 °C colder than −5 °C.

..... °C [1]

39. June/2023/Paper_0580/12/No.7// June/2023/Paper_0580/22/No.2

There are two prime numbers in this list.

27 47 57 61 75 93

Work out the sum of these two prime numbers.

..... [2]

40. June/2023/Paper_0580/12/No.11

The distance from town A to town B on a map is 3.5 cm.
The scale on the map is 1 : 250 000.

Find the actual distance, in kilometres, from town A to town B.

..... km [2]

41. June/2023/Paper_0580/12/No.13

$\mathscr{E} = \{x : 1 \leqslant x \leqslant 20\}$
$E = \{\text{even numbers}\}$
$M = \{\text{multiples of 5}\}$

(a) Find $\text{n}(M)$.

..... [1]

(b) Find the elements in the set $E \cap M$.

..... [1]

42. June/2023/Paper_0580/12/No.14

Without using a calculator, work out $\frac{4}{7} \div 1\frac{5}{21}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [3]

43. June/2023/Paper_0580/12/No.18

(a) Write 45 000 in standard form.

..... [1]

(b) Calculate $6.75 \times 10^{-3} \times 4.2 \times 10^{5}$.
Give your answer in standard form.

..... [1]

44. June/2023/Paper_0580/12/No.20

Buses at a station go to the port or to the town.

Buses leave every 28 minutes for the port.
Buses leave every 48 minutes for the town.

At 10 18 a bus for the port and a bus for the town leave the station together.

Find the next time when a bus for the port and a bus for the town leave the station together.

..... [3]

45. June/2023/Paper_0580/12/No.23

(a) The mass, m kilograms, of object A is 350 kg, correct to the nearest 10 kg.

Complete this statement about the value of m.

..... $\leqslant m <$ ..... [2]

(b) The mass of object B is 348 kg, correct to the nearest kilogram.

Show that the mass of object B may be more than the mass of object A.

..... [1]

46. June/2023/Paper_0580/13/No.1

Write 928 correct to the nearest ten.

..... [1]

47. June/2023/Paper_0580/13/No.2

Write down a fraction that is equivalent to $\frac{7}{9}$.

..... [1]

48. June/2023/Paper_0580/13/No.3

Work out.

$-4+6\times3$

..... [1]

49. June/2023/Paper_0580/13/No.6

Write down the reciprocal of 16 as a decimal.

..... [1]

50. June/2023/Paper_0580/13/No.10

Olga thinks that 87 is a prime number.

Is Olga correct?
Give a reason for your answer.

..... because ..... [1]

51. June/2023/Paper_0580/13/No.11

A film lasts for 2 hours 50 minutes.
The film ends at 23 05.

Find the time the film starts.

..... [1]

52. June/2023/Paper_0580/13/No.13

By writing each number in the calculation correct to 1 significant figure, find an estimate for the value of

$$\frac{6.8 \times 10.6}{3.2 - 0.98}.$$

You must show all your working.

..... [2]

53. June/2023/Paper_0580/13/No.16

Maddie changes 4000 Swiss francs into dollars when the exchange rate is $1 = 0.913 Swiss francs.

Work out how many dollars she receives.

$ ..... [1]

54. June/2023/Paper_0580/13/No.17

Find the highest common factor (HCF) of 32 and 120.

..... [2]

55. June/2023/Paper_0580/13/No.22

Vanessa invests $8500 at a rate of 3.5% per year compound interest.

Calculate the value of her investment at the end of 6 years.
Give your answer correct to the nearest dollar.

$ ..... [3]

56. June/2023/Paper_0580/13/No.24

Without using a calculator, work out $5\frac{11}{12}+2\frac{1}{4}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

57. June/2023/Paper_0580/21/No.2

A train journey starts at 2143.
It takes 8 hours and 32 minutes.

Find the time the journey finishes.

..... [1]

58. June/2023/Paper_0580/21/No.4

By writing each number in the calculation correct to 1 significant figure, work out an estimate for the value of

$$\frac{6.7 \times 2.1}{18 - 5.9}.$$

You must show all your working.

..... [2]

59. June/2023/Paper_0580/21/No.7

The scale of a map is 1 : 125 000.
On a map, the length of an island is 9.4 cm.

Calculate the actual length of the island, giving your answer in kilometres.

..... km [2]

60. June/2023/Paper_0580/21/No.8

(a) The nth term of a sequence is $10-n^2$.

Write down the first three terms of this sequence.

..... , ... , ... [2]

(b) These are the first four terms of another sequence.

7 10 13 16

Find an expression for the nth term of this sequence.

..... [2]

61. June/2023/Paper_0580/21/No.10// June/2023/Paper_0580/22/No.7

Without using a calculator, work out $2\frac{1}{7} \div \frac{5}{9}$.

You must show all your working and give your answer as a mixed number in its simplest form.

..... [3]

62. June/2023/Paper_0580/21/No.13

Anya invests \$6000 in an account that pays compound interest at a rate of r% per year.
At the end of 8 years, the account has earned \$621.70 in interest.

Calculate the value of r.

$r =$ ..... [3]

63. June/2023/Paper_0580/21/No.14

y is directly proportional to the square of $(x + 3)$.
When $x = 2$, $y = 5$.

Find y when $x = 1$.

$y =$ ..... [3]

64. June/2023/Paper_0580/22/No.1

Find the temperature that is 8 °C colder than −5 °C.

..... °C [1]

65. June/2023/Paper_0580/22/No.4

The distance from town A to town B on a map is 3.5 cm.
The scale on the map is 1 : 250 000.

Find the actual distance, in kilometres, from town A to town B.

..... km [2]

66. June/2023/Paper_0580/22/No.6

$\mathscr{E} = \{x: 1 \leqslant x \leqslant 20\}$
$E = \{\text{even numbers}\}$
$M = \{\text{multiples of 5}\}$

(a) Find $\text{n}(M)$.

..... [1]

(b) Find the elements in the set $E \cap M$.

..... [1]

(c) $y \notin E$.

Write down a possible value of y.

..... [1]

67. June/2023/Paper_0580/22/No.16

Write $0.62\dot{1}$ as a fraction in its simplest form.
You must show all your working.

..... [3]

68. June/2023/Paper_0580/22/No.19

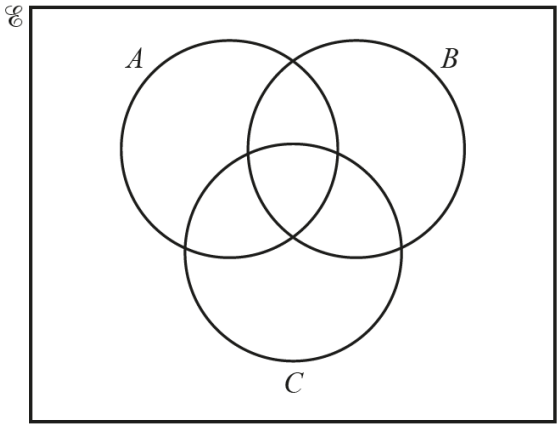
m is inversely proportional to the square of $(t+2)$.
$m = 0.64$ when $t = 3$.

Find m when $t = 8$.

$m =$ ..... [3]

69. June/2023/Paper_0580/22/No.20

In the Venn diagram, shade the region $A \cap B' \cap C$.



[1]

70. June/2023/Paper_0580/23/No.2

A film lasts for 2 hours 50 minutes.
The film ends at 23 05.

Find the time the film starts.

..... [1]

71. June/2023/Paper_0580/23/No.6

At the end of the day, a shopkeeper has 12 tins of cat food left.

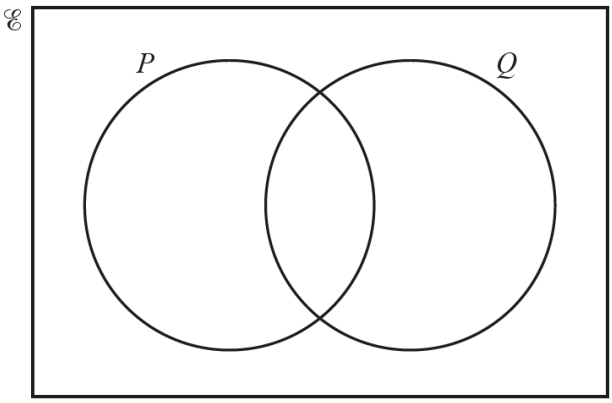
This is $\frac{3}{13}$ of the number he had at the beginning of the day.

Calculate the number of tins he had at the beginning of the day.

..... [2]

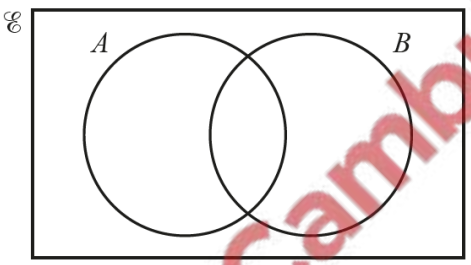
72. June/2023/Paper_0580/23/No.11

(a) $\mathscr{E} = \{ a, b, e, g, l, m, o, r, t, y \}$
$P = \{ a, b, e, g, l, r \}$
$Q = \{ e, g, m, o, r, t, y \}$



Complete the Venn diagram. [2]

(b)



Shade the region $A' \cap B$. [1]

73. June/2023/Paper_0580/23/No.13

Calculate $\sqrt{42} + 3^{0.4}$.

..... [1]

74. June/2023/Paper_0580/23/No.14

Write $0.58\dot{1}$ as a fraction.
You must show all your working and give your answer in its simplest form.

..... [3]

75. June/2023/Paper_0580/23/No.15

The number of trees in a forest is decreasing exponentially at a rate of 1.75% per year.
Eleven years ago there were 980 trees.

Calculate the number of trees in the forest now.
Give your answer correct to the nearest integer.

..... [2]

76. June/2023/Paper_0580/23/No.18

y is inversely proportional to the cube root of $(x + 5)$.
When $x = 3$, $y = 12$.

Find y when $x = 22$.

$y =$ ..... [3]

77. June/2023/Paper_0580/23/No.23

A train travels between two stations.
The distance between the stations is 220 km, correct to the nearest kilometre.
The speed of the train is 125 km/h, correct to the nearest 5 km/h.

Calculate the upper bound for the time the journey takes.
Give your answer in hours and minutes.

..... h ..... min [4]

78. June/2023/Paper_0580/31/No.1

(a) Write the number forty thousand and thirty-three in figures.

..... [1]

(b) Find the value of $\sqrt[3]{729}$.

..... [1]

(c) Find the reciprocal of $\frac{7}{9}$.
Give your answer as a decimal, correct to 3 decimal places.

..... [2]

(d) Find the value of $6^5 \div 3^4$.

..... [2]

(e) Work out $(-9) \times (-7) \div (-3)$.

..... [1]

(f) Work out.

(i) $11 + 9 \times 5 - 4$

..... [1]

(ii) $(11 + 9) \times 5 - 4$

..... [1]

(g) -0.67 $\sqrt{123}$ $\sqrt{49}$ $\frac{5}{9}$ 3.142

From this list, write down an irrational number.

..... [1]

(h) **(i)** Find the lowest common multiple (LCM) of 24 and 104.

..... [2]

(ii) Find the highest common factor (HCF) of 24 and 104.

..... [2]

79. June/2023/Paper_0580/31/No.5

Antonio buys a restaurant for $240 000.

This is $\frac{5}{8}$ of the amount he has available to spend.

(a) Show that he has $144 000 left after buying the restaurant.

[2]

(b) Some of the $144 000 is spent on expenses.
Expenses are wages, equipment and supplies in the ratio

wages : equipment : supplies = 9 : 5 : 8.

The amount spent on wages is $45 000.

(i) Find the amount spent on

(a) equipment

$ ..... [2]

(b) supplies.

$ ..... [1]

(ii) Work out the amount Antonio has left now.

$ ..... [2]

(c) Antonio borrows $25 400 for 6 years at a rate of 5% per year simple interest.

Calculate the total amount he repays at the end of the 6 years.

$ ..... [3]

(d) In one week, the number of customers in the restaurant was 560.
In the next week, the number of customers in the restaurant was 656.

Calculate the percentage increase.

..... % [2]

80. June/2023/Paper_0580/32/No.1

(a) Write the number three hundred thousand and three in figures.

..... [1]

(b) Write 15 896 correct to

(i) the nearest thousand

..... [1]

(ii) the nearest ten.

..... [1]

(c) By writing each number in the calculation correct to 1 significant figure, work out an estimate for the value of

$$\frac{28.9 \times 5.49}{0.472 + 0.97}.$$

You must show all your working.

..... [2]

(d) Find the value of

(i) $\sqrt{1849}$

..... [1]

(ii) $5^0 - 5^{-1}$

..... [1]

(iii) $\frac{5 \sin 30 - 8}{11}$.

..... [1]

(e) A cyclist travels at a constant speed of 8.5 metres per second.

(i) Work out how long the cyclist takes to travel a distance of 5.27 kilometres.
Give your answer in minutes and seconds.

..... min ..... s [4]

(ii) The cyclist increases speed from 8.5 m/s to 10.2 m/s.

Work out the percentage increase in speed.

..... % [2]

81. June/2023/Paper_0580/32/No.9

(a) These are the first four terms of a sequence.

2 8 14 20

(i) Write down the next term.

..... [1]

(ii) Write down the term to term rule for continuing the sequence.

..... [1]

(iii) Find an expression for the nth term.

..... [2]

(b) **(i)** Find the first three terms of the sequence with nth term $n^2 + 5$.

....., ..., ... [2]

(ii) These are the first four terms of another sequence.

7 10 15 22

Find an expression for the nth term of this sequence.

..... [1]

82. June/2023/Paper_0580/33/No.2

A shop sells food and drink.

(a) Bananas cost \$1.20 per kilogram and apples cost \$2.25 per bag.

Work out the total cost of 3.5 kg of bananas and 2 bags of apples.

\$ ..... [3]

(b) Students receive a 10% discount on their shopping.
Before the discount, the cost of a student's shopping is \$16.80 .

Work out the amount of the discount.

\$ ..... [1]

(c) The cost of a cabbage increases by 15%.

Calculate the new price if the original price is \$1.80 .

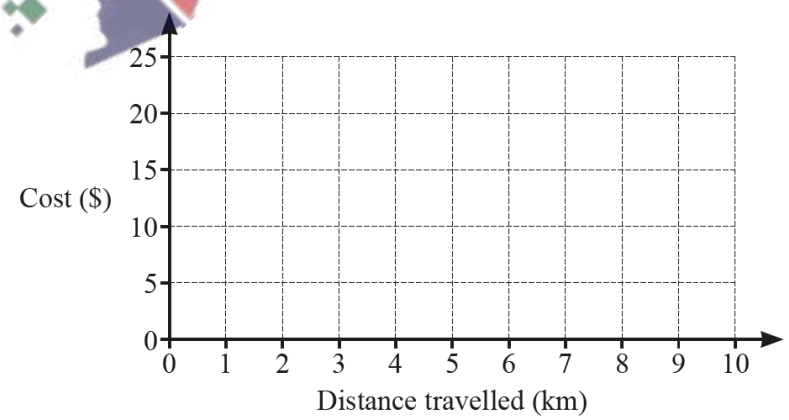
\$ ..... [2]

(d) Some customers have their shopping delivered to their home.
The cost is \$5 plus \$1.50 for each kilometre travelled from the shop to their home.

(i) Show that the cost for a customer living 10 km from the shop is \$20.

[1]

(ii)



On the grid, draw a line to show the cost of having shopping delivered. [2]

(e) A bottle of water costs $1.55 .
Suki has $20.

Work out the maximum number of bottles Suki can buy and the change she receives.

Maximum number of bottles .....

Change $ ..... [3]

(f) A farmer delivers eggs to the shop in trays of 50.
The eggs are then put into boxes of 12.
There are no eggs left in the trays and all of the egg boxes are full.

Work out the smallest possible number of eggs that the farmer delivers.

..... [2]

(g) The shop sells bottles of orange juice in three different sizes.

Bottle A 0.5 litres $1.30	Bottle B 1.2 litres $3.20	Bottle C 2 litres $5.25

Work out which bottle is the best value.
Show how you decide.

Bottle ..... [3]

83. June/2023/Paper_0580/33/No.5

The grid shows the first three diagrams in a sequence.
Each diagram is made using sticks.

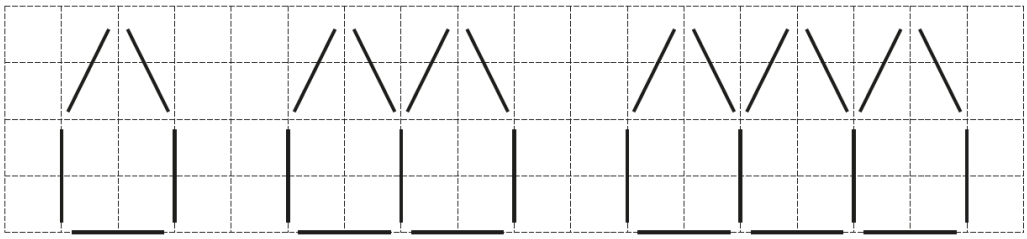


Diagram 1 Diagram 2 Diagram 3

(a) On the grid, draw Diagram 4.

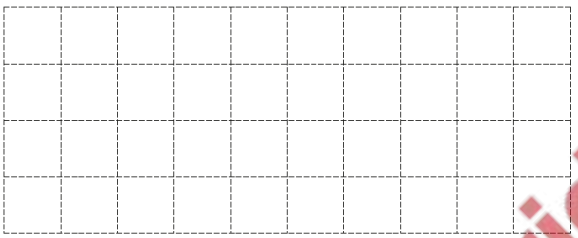


Diagram 4

[1]

(b) Complete the table.

Diagram number	1	2	3	4	5
Number of sticks	5	9	13		

[2]

(c) **(i)** Find an expression, in terms of n, for the number of sticks in Diagram n.

..... [2]

(ii) One of the diagrams has 73 sticks.

Work out its Diagram number.

Diagram ..... [2]

(d) (i) Show that the total number of sticks needed to make the first 3 diagrams is 27.

[1]

(ii) The total number of sticks needed to make the first k diagrams is $2k^2 + 3k$.

Show that this expression gives the correct total number of sticks needed to make the first 3 diagrams.

[2]

(iii) Tobias wants to make the first 10 diagrams.
He has already made the first 3 diagrams.
He has 240 sticks left to make the remaining 7 diagrams.

Work out how many sticks he has left when all 10 diagrams are made.

..... [4]

84. June/2023/Paper_0580/33/No.8

(a) The length, l m, of a piece of wire is 18.7 metres, correct to the nearest 10 centimetres.

Complete the statement about the value of l.

..... $\leqslant l <$ ..... [2]

(b) 850 metres of wire has a mass of 130.5 kilograms.

Work out the length of wire, in metres, that has a mass of 900 grams.

..... m [3]

(c) Aluminium is used to make the wire.
The mass of 1 cm^3 of aluminium is 2.7 grams.

Work out the mass, in grams, of 6000 cm^3 of aluminium.
Give your answer in standard form.

..... g [2]

(d) A 12 metre length of wire increases in length to 12.017 metres when its temperature rises.

Calculate the percentage increase in the length of the wire.

..... % [2]

85. June/2023/Paper_0580/41/No.1

(a) An orchard has 1250 trees.
The trees are in the ratio apple : pear : cherry = 12 : 9 : 4.

(i) Calculate the number of apple trees.

..... [2]

(ii) Last year in the orchard, the mean mass of fruit produced was 64 kg per tree.

Calculate the total mass of fruit produced last year.
Give your answer in tonnes.
[1 tonne = 1000 kg]

..... tonnes [2]

(iii) Last year, the mean mass of pears produced was 54 kg per tree.
This was a decrease of 10% on the mean mass of pears produced per tree from the year before.

Calculate the mean mass of pears produced by each pear tree the year before.

..... kg [2]

(iv) The orchard loses $\frac{1}{5}$ of its total number of trees in a storm.

Calculate the number of trees that remain.

..... [2]

(b) Paulo buys some pears from a market.
Pears cost \$0.54 each or 0.51 euros each.

(i) Paulo pays **in dollars** for 12 pears.

Calculate the change he receives from \$10.

\$ ..... [2]

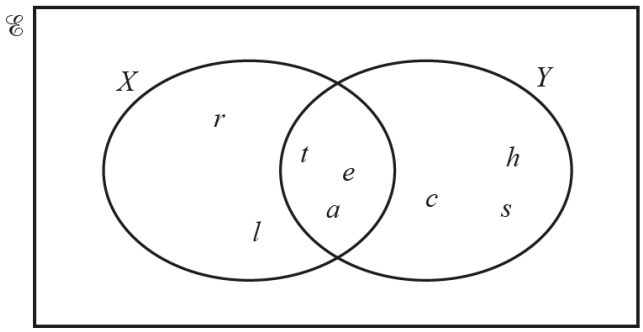
(ii) The exchange rate is \$1 = 0.826 euros.

Calculate how much more Paulo pays for **each** pear when he pays in euros.
Give your answer in dollars, correct to the nearest cent.

\$ ..... [3]

86. June/2023/Paper_0580/41/No.9

(a) The Venn diagram shows set X and set Y.



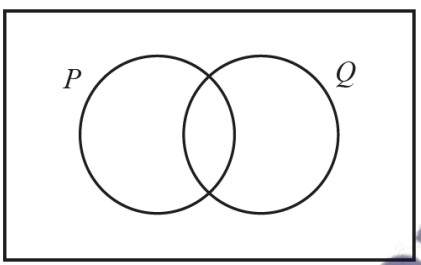
(i) List the elements of X.

..... [1]

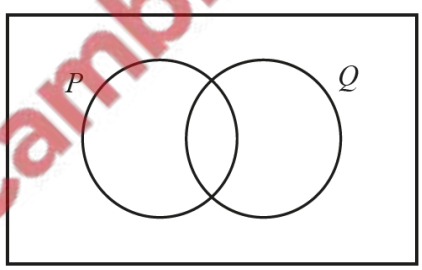
(ii) Find $n(Y')$.

..... [1]

(b) In each Venn diagram, shade the required region.



$P \cup Q$



$P' \cap Q$

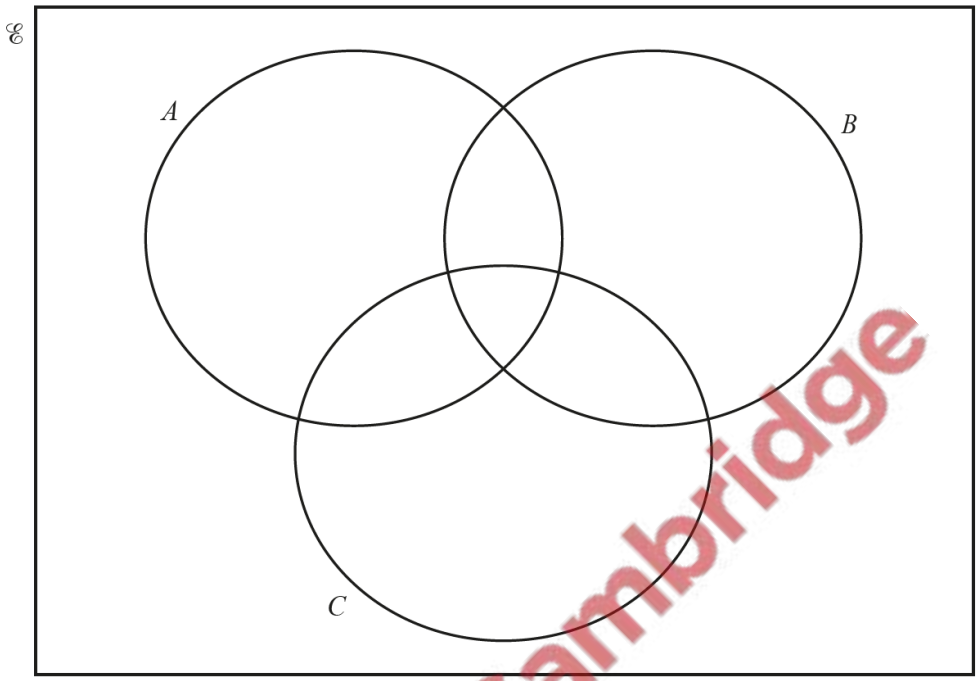
[2]

(c) $\mathscr{E} = \{\text{positive integers} < 13\}$

$A = \{x : x < 9\}$

$B = \{x : x \text{ is even}\}$

$C = \{x : x \text{ is a multiple of } 3\}$



(i) Complete the Venn diagram. [3]

(ii) Find $\text{n}(A' \cup (B \cap C))$.

..... [1]

87. June/2023/Paper_0580/42/No.2

(a) Anil changes $830 into euros when the exchange rate is 1 euro = $1.16 .
He spends 500 euros.
He then changes the remaining money back into dollars at the same exchange rate.

Work out how much, in dollars, Anil receives.

$ ..... [3]

(b) In 2021, Anil earns $37 000.

(i) He spends $12 400 on bills in 2021.

Calculate the percentage of his earnings he spends on bills.

..... % [2]

(ii) His earnings of $37 000 increase by 3.2% in 2022.

Calculate his earnings in 2022.

$ ..... [2]

(c) Anil invests $3500 in an account that pays a rate of 2.4% per year compound interest.

(i) Calculate the total interest earned at the end of 5 years.

$ ..... [3]

(ii) Find the number of complete years before Anil has at least $5000 in this account.

..... years [3]

88. June/2023/Paper_0580/43/No.1

(a) Tomas sells a computer, a bike and a phone.
The amounts he receives are in the ratio computer : bike : phone = 14 : 17 : 9.

(i) Calculate the amount he receives for the phone as a percentage of the total.

..... % [2]

(ii) The total amount he receives is $560.

Calculate how much he receives for the bike.

$ ..... [2]

(iii) Tomas originally bought the bike for $195.
He wanted to make a profit of at least 25% when he sold it.

Does Tomas make a profit of at least 25%?
You must show all your working to support your decision.

[3]

(b) Ulla invests $725 for 6 years in an account paying simple interest at a rate of 1.3% per year.

Calculate the total interest earned at the end of 6 years.

$ ..... [2]

(c) In a sale, all prices are reduced by 24%.
Victor pays $36.86 for a pair of shoes in the sale.

Calculate the original price of the shoes.

$ ..... [2]