Level 1 / Level 2 GCSE (9 – 1)

MATHEMATICS

Paper 2 (Calculator)

Foundation Tier

Time : 1 hour 30 minutes **Paper : 1 MA1 / 2F**

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- You must **show all your working.**
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may be used.**
- If your calculator does not have a π button, take the value of π to be 3.142 unless the question instructs otherwise.

Information

- The total mark for this paper is 80.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

Write your answers in the spaces provided.

You must write down all the stages in your working.

1. Write 0.47 as a fraction.

$\frac{47}{100}$ (1)

……
(Total for Question 1 is 1 mark)

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2. Write the following numbers in order of size.

Start with the smallest number.

-5 8 2 -11 1

-11 -5 1 2 8 (1)

……
(Total for Question 2 is 1 mark)

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3. Write down two factors of 12.

1 and 12 OR 2 and 6 OR 3 and 4 (1)

……
(Total for Question 3 is 1 mark)

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4. Change 1830 meters to kilometres.

$\frac{1830}{1000} = 1.83$ (1)

…… km
(Total for Question 4 is 1 mark)

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5. Write the number one million sixty-six thousand in figures.

1066000 (1)

.....

(Total for Question 5 is 1 mark)

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6. Tom has a mobile phone.

He has to pay 25 p for every minute of calls and pay 10 p for every text he sends.

Last month Tom:

- Made a total of 250 minutes of calls
- Sent 300 texts

Tom has £100.

He thinks he will get £6.50 change.

Is Tom correct?

You must show how you get your answer.

Cost of calls: $250 \times 25\text{ p} = 6250\text{ p} = £62.50$

Cost of texts: $300 \times 10\text{ p} = 3000\text{ p} = £30.00$

Total cost: £62.50 + £30 = £92.50

£100 – £92.50 = £7.50 No

(1) For either the cost of calls or cost of text
(1) For the total cost
(1) For change received and conclusion

(Total for Question 6 is 3 marks)

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7. John weighs k kilograms. His son Josh weighs $\frac{1}{4}$ of John's weight. How much, in kilograms, does Josh weigh?

$\frac{k}{4}$ (1)

.....

(Total for Question 7 is 1 mark)

---

8. a. Simplify $k \times m \times \frac{1}{3}$

$\frac{km}{3}$ (1)

.....

(1)

b. Simplify $p + p + p + p + p$

$5p$ (1)

.....

(1)

c. Simplify fully $\frac{2\times2\times a\times a\times a}{2\times2\times2\times a}$

numerator $2^2 \times a^3$ OR denominator $2^3 \times a$ OR $\frac{a^2}{2}$ (1)

$\frac{a^2}{2}$ (1)

.....

(2)

(Total for Question 8 is 4 marks)

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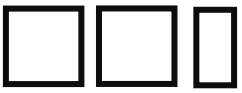
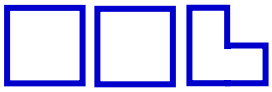
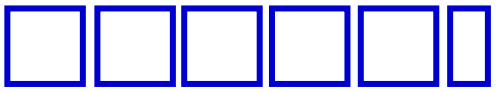
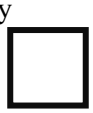
9. The pictogram shows the number of two different types of burger sold in one day.

Big Mac	
Quarter Pounder with cheese	
Double Cheeseburger	
Hamburger	

Key

represents
12 burgers

a. Write down the number of Big Mac's sold.

15 (1)

.....

(1)

A total of 144 burgers sold in one day.

The number of hamburgers sold was twice the number of double cheeseburgers sold.

b. Use this information to complete the pictogram.

Total number of Big Macs and Quarter Pounders sold: 15+30=45

Total number of Double Cheeseburger and Hamburger sold: 144 – 45 = 99

Let the number of double cheeseburger = x

The number of hamburger = $2x$

$2x + x = 99$ (1)

$3x = 99$ (1) with correct diagram

$x = 33$ (1) with correct diagram

Number of double cheeseburger = 33

Number of hamburger= 66

(3)

(Total for Question 9 is 4 marks)

10. Here is a formula: $Y = 2X - 5$

a. Find the value of Y when $X = 8$.

$Y = 2(8) - 5 = 11$ (1)

.....

(1)

b. Make X the subject of the formula.

$Y + 5 = 2X$ (1)

$X = \frac{Y+5}{2}$ (1)

.....

(2)

c. Find the value of X when $Y = 21$.

$X = \frac{21+5}{2} = 13$ (1)

.....

(1)

(Total for Question 10 is 4 marks)

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11. Work out

$$\frac{\sqrt{25}-9}{-2-2^3}$$

$\frac{5-9}{-2-8} = \frac{-4}{-10} = \frac{4}{10}$

(1) For either numerator or denominator correct

(1) For complete correct answer

(Total for Question 11 is 2 marks)

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12. Here is a gym timetable on Saturday morning.

Each class starts as the previous one finishes.

Class	Start time
Kettle bells	09 00
Bulgarian bags	09 45
Battle ropes	10 40
Medicine balls	11 20
Sand bags	12 05
Push up grips	13 00

a. Mike wants to go to Bulgarian bags and Medicine balls classes.

How long will he exercise in total?

55 + 45 = 100 min

Either 55 OR 45 (1)

100 min (1)

…… min

(2)

b. It takes Jill 35 minutes to get to the gym and be ready to start. What is the latest time she can set off to be in time for Sand bags?

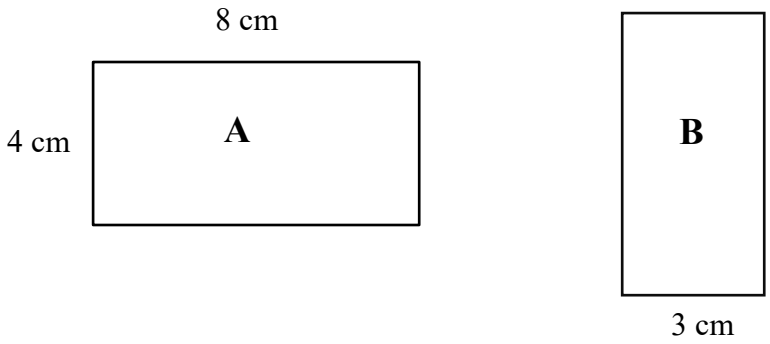
11 : 30 (1)

……

(1)

(Total for Question 12 is 3 marks)

13. Here are two rectangles.



The perimeter of rectangle **A** is equal to the area of the rectangle **B**.

Find the length of one side of rectangle **B**.

Perimeter of rectangle A $= 2(4+8) = 24$ (1)

Area of B $= 3 \times x = 24$ (1)

Length of one side of rectangle B $= x = 8$ (1)

…….. cm

(Total for Question 13 is 3 marks)

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14. Write the ratio 7.5 : 1.25 in the form n : 1.

$\frac{7.5}{1.25} : \frac{1.25}{1.25} = 6 : 1$ (1)

……

(Total for Question 14 is 1 mark)

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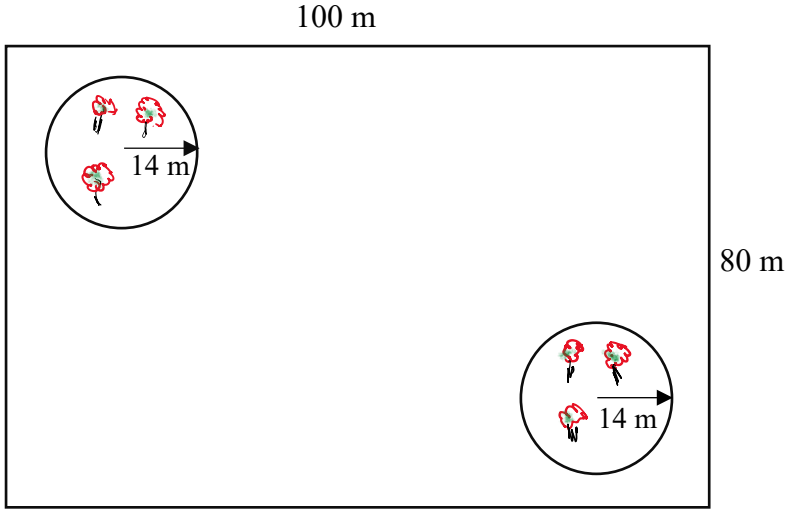
15. The diagram shows a rectangular garden.



The garden is 100 metres long and 80 metres wide.

There are two circular flower-beds in the garden and each one has a radius 14 metres.

The rest of the garden is grass.

Fred says 'The area of the grass is 83% of the garden'.

Is Fred correct?

You must explain your answer.

Either Area of garden = $100 \times 80 = 8000$ OR area of circle $\pi(14)^2 = 196\pi$ (1)

Area of grass = $8000 - 2\pi(14)^2 = 6768.4956$ (1)

$\frac{6768.4956}{8000} \times 100\% =$ 84.6 % so Fred is incorrect.

Correct equation (1) correct answer with conclusion (1)

(Total for Question 15 is 4 marks)

16. 100 g of cheddar cheese contains 4 g of carbohydrates.

100 g of fruit flavoured yogurt contains 19 g carbohydrates.

Alice has 35 g of cheddar cheese and 180 g of fruit flavoured yogurt for breakfast.

Work out the total weight of carbohydrates in the breakfast.

Carbohydrates from cheese: $\frac{35\times4}{100} = 1.4$ g (1)

Carbohydrates from yogurt $\frac{180\times19}{100} = 34.2$ g (1)

Total carbohydrates: 1.4 g + 34.2 g = 35.6 g (1)

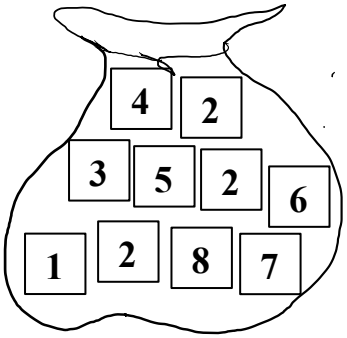
.....

(Total for Question 16 is 3 marks)

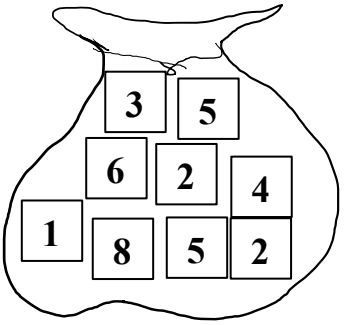
17. Here are two bags **A** and **B**.

Bag **A** contains 10 cards and bag **B** has 9 cards.

Each card has a number on it.



Bag A



Bag B

a. i. Which bag is least likely to have odd numbers?

P(Bag A odd) = $\frac{4}{10}$

P(Bag B odd) = $\frac{4}{9}$

$\frac{4}{10} < \frac{4}{9}$, so bag A is least likely to have odd numbers (1)

……..

(1)

ii. Which bag is most likely to have a total of 10 when two numbers are drawn?

Bag A (2,8) (2,8) (2,8) (3,7) (4,6) (5,5) (6,4) (7,3) (8,2) (8,2) (8,2) 11

Bag B (2,8) (2,8) (4,6) (5,5) (5,5) (5,5) (5,5) (6,4) (8,2) (8,2) 10

Bag A has 11 OR Bag B has 10 (1)

Bag A is most likely (1)

……

(2)

Jill says,

"The probability of getting factors of 6 from bag A is the same as the probability of getting factors of 8 from bag B"

b. Is she correct?

Give a reason for your answer.

Bag A 1, 2, 2, 2, 3, 6 has 6 factors, so P(A prime)= $\frac{6}{10}$

Bag B 1, 2, 2, 4, 8 has 5 factors, so P(B prime) = $\frac{5}{9}$

$\frac{6}{10} \neq \frac{5}{9}$, so Jill is incorrect (1)

.....

(1)

Tom chooses a card from bag **A** 30 times.

c. Work out an estimate for the number of times the card is a prime number.

There are 6 cards with prime numbers on: 2,2,2,3,5,7

$\frac{6}{10} \times 30 = 18$

(1) (1)

.....

(2)

(Total for Question 17 is 5 marks)

18. Sally gets paid £31.25 for 5 hours of work.

John gets paid £50.40 for 8 hours of work.

They both work 36 hours a week.

Work out the total amount of money they both get in a week.

Sally:

Wage for one hour of work: $\frac{£31.25}{5} = £6.25$

Wage for 36 hours of work: $£6.25 \times 36 = £225$ (1)

John:

Wage for one hour of work: $\frac{£50.40}{8} = £6.30$

Wage for 36 hours of work: $£6.30 \times 36 = £226.80$ (1)

Total = £225 + £226.80 = £452.80

(1) (1)

.....

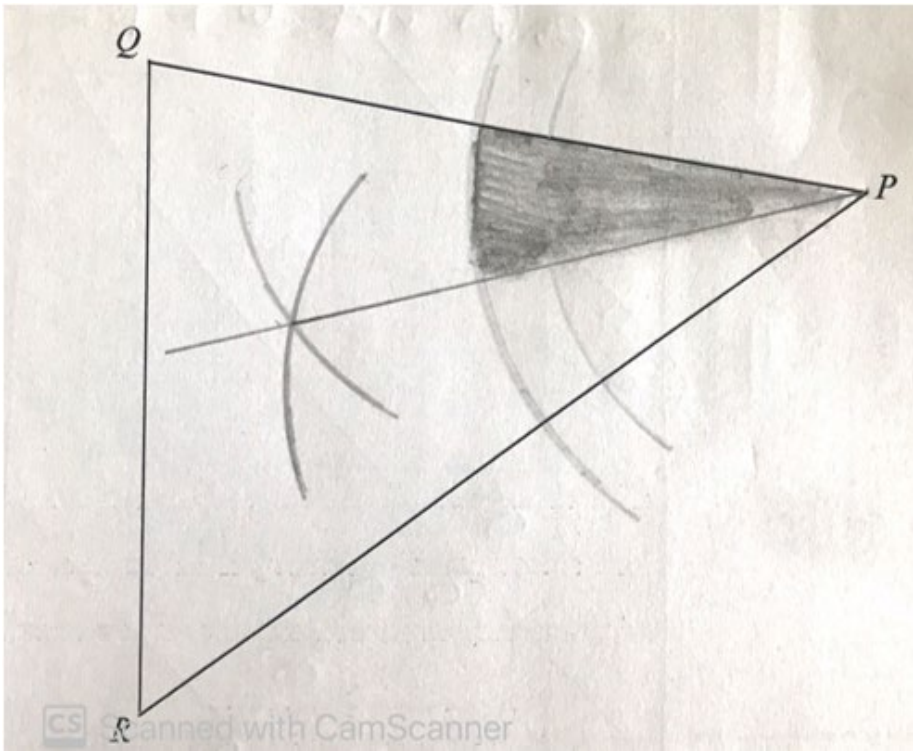
(Total for Question 18 is 4 marks)

19. The diagram represents a triangular garden *PQR*.

The scale of the diagram is 1 cm represents 1 m.

A palm tree is to be planted in the garden so that it is

- Nearer to *PQ* than to *PR*
- Within 5 m of point *P*
- Show, by shading on the diagram, the region where the palm tree is to be planted.



Draws an arc with centre P and two more arcs drawn with centres on the line PR and PQ and a line segment joining from P to point where these two arcs are joined. (1)

Draws an arc of radius 5cm with centre P (1)

Answer within tolerance with region shaded (1)

(Total for Question 19 is 3 marks)

20. a. Solve $9 - 2x > x$

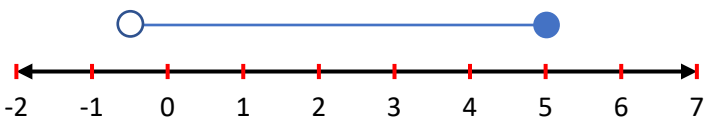
$9 > 3x$ (1)

$x > 3$ (1)

……..

(2)

b. On the number line below, show the set of values of x for which $-1 < 2x \leq 10$



(1)

$-\frac{1}{2} < x \leq 5$ (1)

(2)

(Total for Question 20 is 4 marks)

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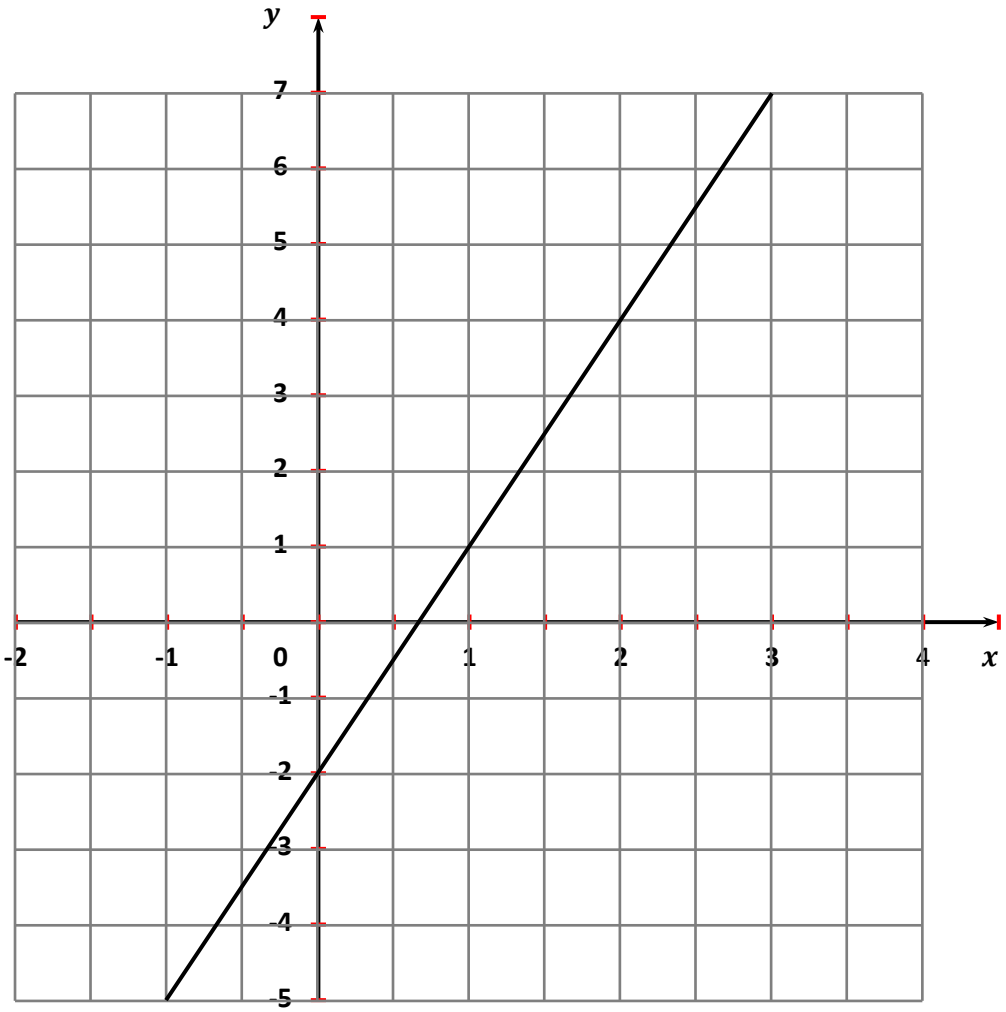
21. On the grid below, draw the graph of $y = 3x - 2$ for values of x from -1 to 3.

(-1,-5) (0,-2) (1,1) (2,4) (3,7)

At least 2 correct points stated or plotted (1)

At least 3 correct points stated or plotted (1)

For a correct line drawn between $x = -1$ to $x = 3$ (1)



(Total for Question 21 is 3 marks)

22. There are 120 students at Abbey High School.

The table shows the number of students in each of the four Year 10 Science classes.

Science class	Number of students
10 A	32
10 B	28
10 C	24
10 D	36

A sample of size 30 is to be taken.

a. How many students from each year 10 classes should be in the sample?

$\frac{30}{120} = \frac{1}{4} = 0.25$ (1)

Class 10A $= 0.25 \times 32 = 8$

Class 10B $= 0.25 \times 28 = 7$

Class 10C $= 0.25 \times 24 = 6$

Class 10D $= 0.25 \times 36 = 9$

At least 3 correct answers (1) All correct answers (1)

(3)

……

b. State any assumption you made and explain how this may affect your answer.

Correct statement

sample is representative (otherwise answer wrong) OR

random sample (otherwise answer will be different) OR

the 30 students are from the 120 (otherwise not accurate) OR

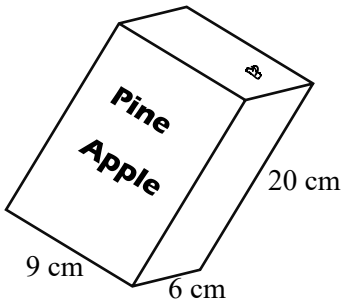
there is no bias

……

(1)

(Total for Question 22 is 4 marks)

23. Pineapple juice is poured from a carton into a jug, as shown.



11 cm

The carton is a cuboid measuring 9 cm by 6 cm by 20 cm.

The jug is a cylinder with a diameter of 11 cm.

What is depth of pineapple juice in the jug, when a $\frac{2}{3}$ of box of juice has been poured in?

Give your answer correct to 3 significant figures.

Either Volume of cuboid $= 9 \times 6 \times 20$ OR volume of jug $= \pi \times \left(\frac{11}{2}\right)^2 \times h$ (1)

$9 \times 6 \times 20 = \pi \times \left(\frac{11}{2}\right)^2 \times h$ (1)

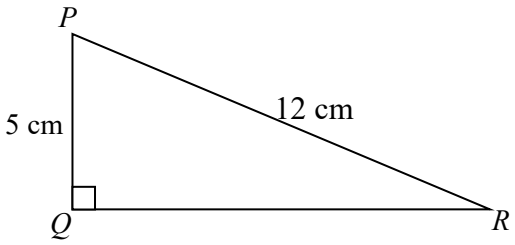
$h = \frac{720}{5.5^2\pi}$ (1)

$h = 7.58$ (1)

..... cm

(Total for Question 23 is 4 marks)

24. *PQR* is a right-angled triangle.



Calculate the size of angle *PRQ*.

$\sin R = \frac{5}{12}$ (1)

$R = 24.6^0$ (1)

.....

(Total for Question 24 is 2 marks)

25. Thomas rounds a number, h, to the nearest ten.

His result is 30.

Write down the error interval for h.

Lower bound 25 or upper bound 35 (1)

Both values are correct (1)

..... $\leq h <$ .....

(Total for Question 25 is 2 marks)

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26. A fruit drink is made from orange, pineapple and apple juice.

The ratio of orange to apple juice is 1 : 4.

The amount of pineapple juice is half the amount of apple juice.

Olivia wants to make 70 litres of fruit juice for an evening party. How much each type of juice does she need?

Orange : Pine apple : Apple juice = 1 : 2 : 4 (1)

$\frac{70}{7} = 10$ (1)

Orange = 10

Pineapple = 20

Apple = 40

At least two amounts of juice are correct (1)

All the amounts of juice are correct (1)

.....

(Total for Question 26 is 4 marks)

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27. a. Write 2.58×10^{-2} as an ordinary number.

0.0258 (1)

(1)

……

b. Write 53900 in standard form.

5.39×10^4 (1)

(1)

……..

(Total for Question 27 is 2 marks)

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28. Here are the first five terms of a Fibonacci sequence.

5 5 10 15 25

a. Write down the next two terms of the sequence.

40, 65 (1)

(1)

……

The first three terms of a different Fibonacci sequence are

p p $2p$

b. Find the 8th term of this sequence.

$3p$, $5p$, $8p$, $13p$, $21p$

At least the next four terms are correct (1)

8^{th} term is $21p$ (1)

(2)

……

(Total for Question 28 is 3 marks)

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29. $p = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$ $q = \begin{pmatrix} -1 \\ 4 \end{pmatrix}$

Work out $2p - 3q$ as a column vector.

Either $2p = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$ or $3q = \begin{pmatrix} -3 \\ 12 \end{pmatrix}$ (1)

$\begin{pmatrix} 6 \\ -4 \end{pmatrix} - \begin{pmatrix} -3 \\ 12 \end{pmatrix} = \begin{pmatrix} 9 \\ -16 \end{pmatrix}$

(1)

$\begin{pmatrix} \cdots\cdots \\ \cdots\cdots \end{pmatrix}$

(Total for Question 29 is 2 marks)