

Section A (Paper 1)

1. Here are the first 4 terms in a number sequence.

124 127 130 133

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

136

(1)

- (b) Write down a formula for the n th term in this number sequence.

$121 + 3n$

(2)

- (c) Calculate the 900th term in this number sequence.

$$121 + 3 \times 900 = 2821$$

(1)

1652 cannot be a term in this number sequence.

- (c) Explain why. if $1652 = 121 + 3n$

$$\Rightarrow 1531 = 3n$$

but 1531 not a multiple of 3

note 130 is not divisible by 3 but is in the sequence
so 1652 is not divisible by 3 is not enough.

(1)

2. Three women earned a total of £36,000

They shared the £36,000 in the ratio 7:3:2

Rose received the largest amount.

- (a) Work out the amount Rose received.

$$7 + 3 + 2 = 12$$

$$\frac{36000}{12} = 3000$$

$$\text{So } 7:3:2$$

$$7 \times 3000 : 3 \times 3000 : 2 \times 3000$$

$$£ 21,000$$

(3)

generally well done

8

3. Brass is made up of copper and zinc. Every 100 grams of brass contains 20 grams of zinc.

Work out the weight of zinc in 60 grams of brass.

~~100g brass~~
In 100g brass - 20g zinc : 80g copper.

2 : 8

1 : 4

so $1+4=5$ so $\frac{60}{5} = 12$ so 1

so 12 : 48

12 ~~g~~ g

(2)

4. A piece of aluminium has volume 180cm^3 . Aluminium has a density of 2.6g/cm^3 .

- (a) Write down a formula that connects density, mass and volume.

you can use the units to work out formula

$$\text{density} = \frac{\text{mass (g)}}{\text{volume (cm}^3\text{)}}$$

(1)

- (b) Find the mass of the piece of Aluminium

$$2.6 = \frac{\text{mass}}{180}$$

$$\text{mass} = 2.6 \times 180$$

468

(2)

5. Solve

(a) $3x + 16 = 4$

$$3x = -12$$

$$x = -4$$

-4

(1)

(b) $4(x+7) = 36$

$$x+7 = 9$$

$$x = 2$$

2

(2)

6. Nicola invests £5100 for 7 years at 2% per annum compound interest (i.e. at the end of every year the money in the bank is increased by 2%)

(a) How much money does she have at the end of the first year?

$$5100 \times 1.02$$

$$\underline{\pounds 5202}$$

(1)

(b) Use your answer to part (a) to work out how much money she has at the end of the second year?

$$5202 \times 1.02$$

$$\underline{\pounds 5306.04}$$

(1)

(d) How much money does she have at the end of 17 years (to the nearest penny)?

$$5100 \times 1.02^{17}$$

$$\underline{\pounds 7141.23}$$

(2)

some people instead as 7. READ THE QUESTION

7. Bill buys a new machine. The value of the machine drops in a year by 22% to £3042.

What was the cost of the new machine?

$$\text{cost new} \times 0.78 = 3042$$

$$\text{cost new} = \frac{3042}{0.78} =$$

$$\underline{\pounds 3900}$$

(3)

8. A school snack bar offers a choice of four snacks. The four snacks are burgers, pizza, pasta and salad. Students can choose one of these four snacks.

The table shows the probability that a student will choose burger or pizza or salad.

Snack	burger	pizza	pasta	salad
Probability	0.35	0.15		0.2

300 students used the snack bar on Tuesday.

Work out an estimate for the number of students who chose pizza.

$$300 \times 0.15$$

Many people need to Read the question pizza not pasta

$$\underline{45}$$

(2)

9. Ron came back from Spain with some money left over.

The exchange rate is £1 = €1.13

How many pounds is €2000 worth (to the nearest penny)?

don't round up here

$$\begin{aligned} \text{£} 1 &: 1.13 \text{ euros} \\ \text{£} \frac{1}{1.13} &: 1 \text{ euro} \\ 2000 \times \frac{1}{1.13} &: 2000 \end{aligned}$$

$$\text{£} 1769.91$$

(3)

10. (i) We are 300,000,000,000,000,000,000,000 kilometres from the centre of our galaxy (The Milky Way). How far is that when written in standard form (in kilometres)?

$$3 \times 10^{20} \text{ km}$$

(2)

- (iii) The mass of a proton is $1.672621637 \times 10^{-27}$ kg. In standard form, what is that mass to 1 significant figure (in kg)?

$$2 \times 10^{-27} \text{ kg}$$

(2)

11. Show your working to calculate $7\frac{1}{3} + \frac{3}{5}$

$$7\frac{1}{3} + \frac{3}{5} = \frac{22}{3} + \frac{3}{5}$$

$$= \frac{110}{15} + \frac{9}{15}$$

$$= \frac{119}{15} = 7\frac{14}{15}$$

$$7\frac{14}{15}$$

(3)

12. Show your working to convert the recurring decimal $0.\dot{2}9$ to a fraction.

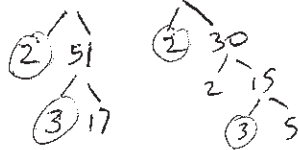
$$\begin{aligned} x &= 0.\dot{2}9 \\ 100x &= 29.\dot{2}9 \\ 99x &= 29 \\ x &= \frac{29}{99} \end{aligned}$$

- many people did not show enough working to give a clear argument.

$$\frac{29}{99}$$

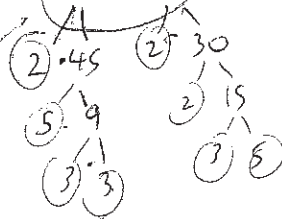
- answer is worth no marks because you can use your calc.

13. (a) Find the HCF of 102 and 60



$$2 \times 3 = 6$$

- (b) Find the LCM of 90 and 60



$$2^2 \times 3^2 \times 5 = 180$$

$$180$$

read the question
it's different numbers

8

14.

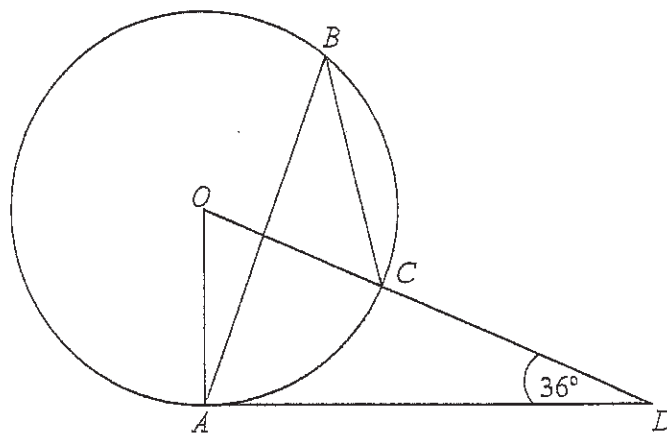


Diagram NOT accurately drawn

The diagram shows a circle centre O .
 A , B and C are points on the circumference.

DCO is a straight line.
 DA is a tangent to the circle.

Angle $ADO = 36^\circ$

(a) Fill in the missing number in this sentence

"Angle between a tangent and a radius is 90"

(1)

(b) Work out the size of angle AOD .

$$180 - 90 - 36 =$$

$$\underline{\hspace{1cm}} \text{ 54 }^\circ$$

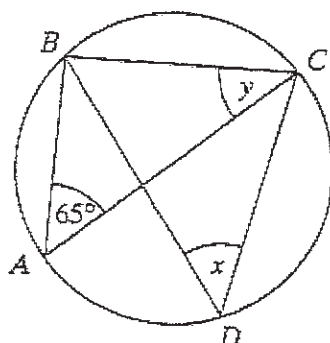
(2)

*generally
well
done*

3

15. A, B, C and D are points on the circumference of a circle.

AC is a diameter of the circle. Angle $BAC = 65^\circ$



Not drawn accurately

- (a) Write down the value of x .

65

(1)

- (b) Give a reason for your answer

you must either

give

the

exact

value

or

explain

absolutely

correctly

your reason.

angles in same segment are equal (1)

- (c) Write down the size of angle ABC

90

(1)

- (d) Give a reason for your answer

AC a diameter and angle in a semicircle is 90° (1)

- (e) Calculate the value of y .

$$180 - 65 - 90$$

25

(1)

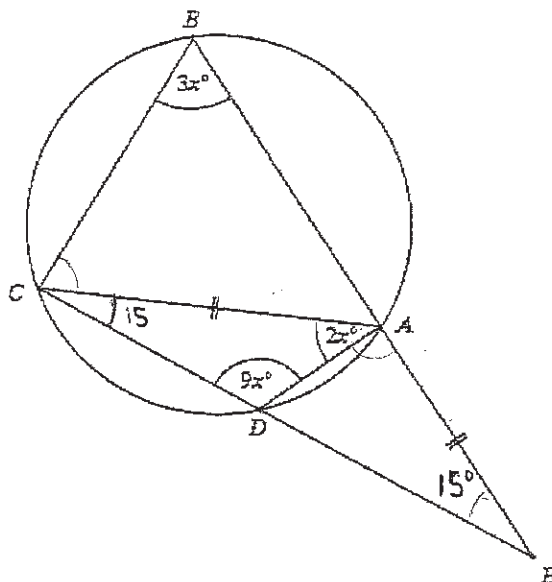
5

16. The diagram shows a cyclic quadrilateral $ABCD$.

The straight lines BA and CD are extended and meet at E .

$EA = AC$ Angle $ABC = 3x^\circ$ Angle $ADC = 9x^\circ$ Angle $DAC = 2x^\circ$

Not drawn accurately



- (i) Fill in the missing words in this sentence

"The opposite angles in a cyclic quadrilateral add up to 180 degrees."

(1)

- (ii) Calculate the value of x

$$\begin{aligned} 9x + 3x &= 180^\circ \\ 12x &= 180 \\ x &= \frac{180}{12} \end{aligned}$$

15

..... (3)

- (iii) Calculate the size of angle EAD .

$$\begin{aligned} \angle ADE &= 180 - 135 = 45 \\ \angle ACD &= 180 - 135 - 30 = 15 \\ \angle ADE &= 180 - 135 = 45 \\ \angle EAD &= 180 - 45 - 15 = 120 \end{aligned}$$

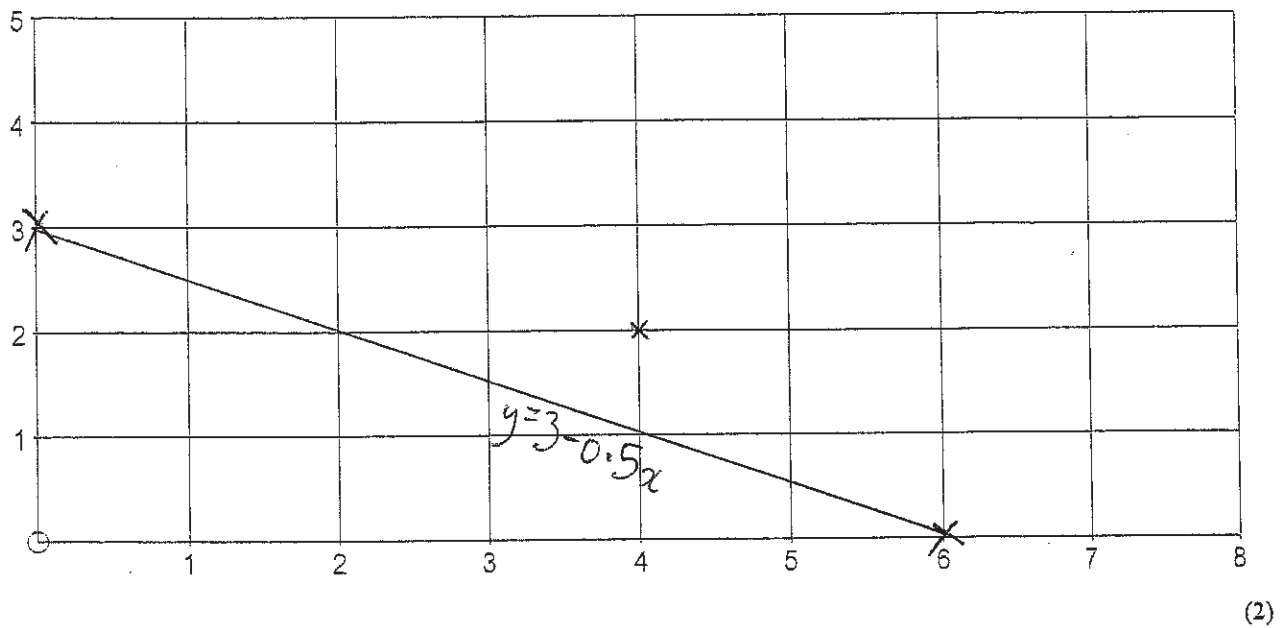
120°

..... (3)

many people got this wrong

7

17. (a) Plot the line $y = 3 - 0.5x$



- (b) A straight line L is parallel to $y = 3 - 0.5x$ and passes through the point $(4, 2)$.

Find the equation of line L .

$$y = c - 0.5x$$

And.

$$2 = c - 0.5 \times 4$$

$$2 = c - 2$$

$$4 = c$$

$$\underline{y = 4 - 0.5x}$$

(3)

5

18.

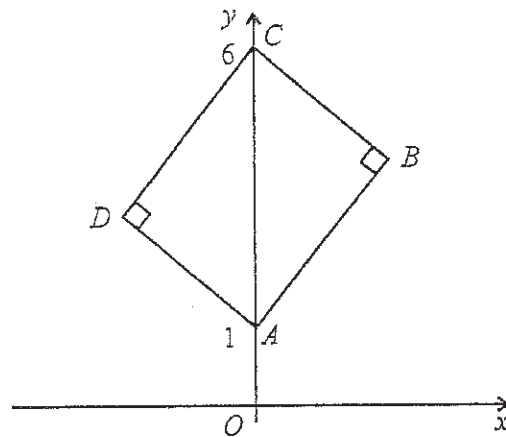


Diagram NOT
accurately drawn

$ABCD$ is a rectangle.

A is the point $(0, 1)$.

C is the point $(0, 6)$.

The equation of the straight line through A and B is $y = 2x + 1$

Find the equation of the straight line through D and C .

$$y = 2x + 6$$

$$\underline{y = 2x + 6} \quad (3)$$

19. Simplify fully

(a) $2(3x + 4) - 3(4x - 5)$ $6x + 8 - 12x + 15$

$$\underline{23 - 6x} \quad (2)$$

(b) $(xy^3)^2$ squared means write
out twice
 $xy^3xy^3 = x^2y^6$

Many people
made a mistake
here
look at
solution
method (2)

$$\underline{x^2y^6}$$

ANSWERS (Year 10 A/B)

Section B (1)

- 1) Write down the answer to $\frac{23+1.05}{\sqrt{12}-3}$ correct to 3 significant figures.

Answer: 51.8.....(2)

- 2) (a) What is the gradient of the line $2y = x + 4$?

$$y = \frac{1}{2}x + 2$$

Answer: $\frac{1}{2}$(1)

- (b) Write down the equation of a different line with the same gradient.

Answer: $y = \frac{1}{2}x + c$(1)

- 3) (a) Factorise $x^2 + 7x + 10$

Answer: $(x+2)(x+5)$(2)

- (b) Hence, solve $x^2 + 7x + 10 = 0$

Answer: $x = -2$ or -5(2)

- 4) (a) When factorised, 24 can be written as $2^a \times 3^b$. Calculate $a + b$.

$$\begin{array}{c} 24 \\ / \quad \backslash \\ 2 \quad 12 \\ \quad / \quad \backslash \\ \quad 2 \quad 6 \\ \quad \quad / \quad \backslash \\ \quad \quad 2 \quad 3 \end{array} = 2^3 \times 3^1$$

Answer: $a + b$ 4.....(2)

poorly worded question. I accepted lots of answers, such as $0, \frac{25}{24}, \text{etc...}$

(b) What is the smallest number 24 must be multiplied by to make it a square number?

$$24 = 2^3 \times 3^1 (\times 2 \times 3) = 2^4 \times 3^2 = (2^2 \times 3)^2$$

~~$$24 \times 3 = 2^3 \times 3^2 = 72$$~~

Answer:.....6.....(1)

5) (a) When I bought my first car it was worth £3200. It has since lost 15% of its value. What is it worth now?

$$3200 \times 0.85$$

Answer:.....2720.....(2)

(b) At the same time my friend bought a classic sports car which increased by 15% to £7360. What did he pay for it originally?

$$x \times 1.15 = 7360$$

$$x = \frac{7360}{1.15}$$

Answer:.....6400.....(2)

6) I have a biased dice which I threw 2000 times and recorded the scores as follows:

Score	1	2	3	4	5	6
Frequency	200	400	600	400	100	300

(a) Based on these results, what is the probability that I will roll a 3 on my next throw?

$$P(3) = \frac{600}{2000} = \frac{3}{10}$$

Answer:..... $\frac{3}{10}$(2)

(b) If I were to roll the dice another 100 times, how many 6s do you think I would get?

$$P(6) = \frac{300}{2000} = \frac{15}{100}$$

Answer:.....15.....(2)

7) What is $0.\dot{7}\dot{2}$ as a fraction in its lowest terms?

$$x = 0.\dot{7}\dot{2}$$

$$100x = 72.\dot{7}\dot{2}$$

$$99x = 72 \quad \therefore x = \frac{72}{99} =$$

Answer: $\frac{8}{11}$(2)

8) The following table shows the number of siblings each person in a Year 10 class has:

Siblings	Frequency
0	4
1	6
2	3
3	2

(a) What is the mode?

Answer: 1(1)

(b) What is the range?

Answer: 3(1)

(c) What is the median?

Answer: 1(1)

(d) What is the mean?

$$\frac{0 \times 4 + 1 \times 6 + 2 \times 3 + 3 \times 2}{15} = \frac{18}{15}$$

Answer: 1.2(2)

A new pupil joins the class and she has 2 siblings. What effect will this have on the mean?
Give a reason for your answer.

Answer: $It will increase, because 2 is higher than the mean of 1.2.$(2)

9) Make x the subject of $a - x^2 = b$

$$a - b = x^2$$

$$\therefore x = \sqrt{a - b}$$

Answer: $x = \sqrt{a - b}$(2)