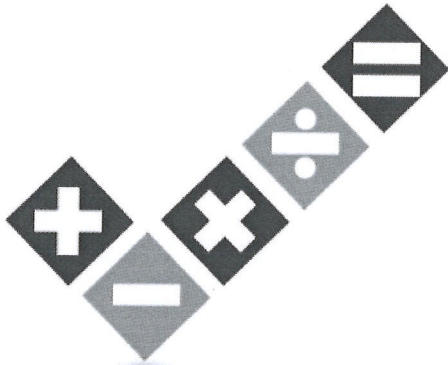DB Solutions

BennettMaths
Engaging Learners

Best Guess Paper – 2H
Calculator

Within this booklet you will find my best guess at what might be on the next edexcel gcse maths paper.

This does not mean that these are the only questions that may appear, some of these questions may appear on paper 3.

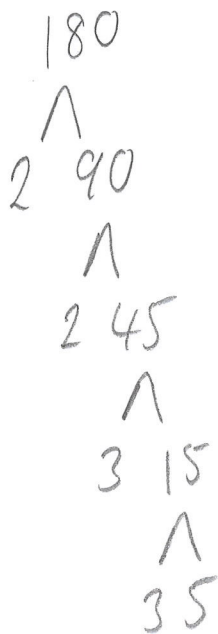Solutions will be uploaded to the website and on my youtube/tiktok accounts.

1(a)   Express 144 as a product of prime factors

144
2 72
  2 36
    2 18
      2 9
        3 3
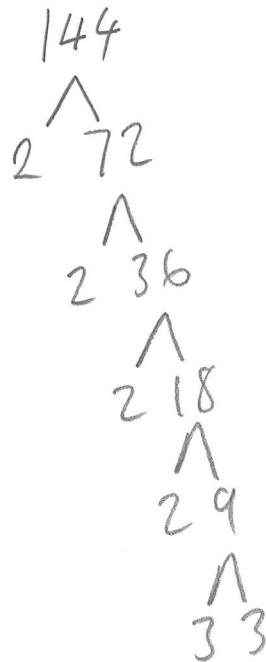
$2^4 \times 3^2$

(2)

1(b)   Find the highest common factor of 144 and 180

180
2 90
  2 45
    3 15
      3 5

$2^2 \times 3^2 \times 5$

144   180

2^2
3^2

$2^2 \times 3^2$
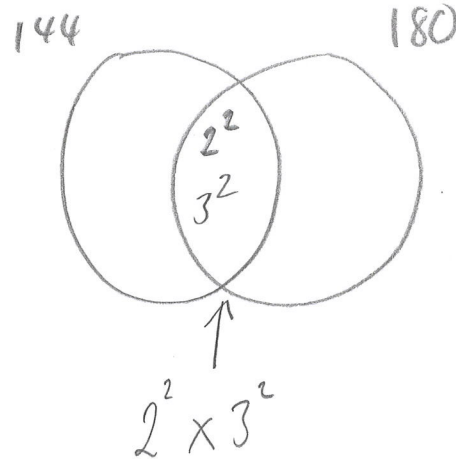
36

(2)

(Total for Question 1 is 4 marks)

2(a)   Leo is going to invest £2500 for 3 years. He will choose one of the following banks.

Bank of Bennett

5.25% compound interest for the 1st year.

4% compound interest for all future years.

Bank of Buckley

4.6% compound interest for the first 3 years

Which bank will return the greatest amount of interest

$2500 \times 1.0525 \times 1.04^2 = 2845.96$

$2500 \times 1.046^3 = 2861.11$

Bank of Buckley

(3)

2(b)   Bank of Buckley have a special offer available of 4.7% compound interest for the first 3 years. Will this affect your answer to part (a)? Give a reason for your answer.

No, it is already the better bank

(1)

(Total for Question 2 is 4 marks)

3   The frequency table below shows the pocket money received by 35 pupils.

Pocket Money (£)	Frequency	mp	mp×f
$0 \leq x < 5$	7	2.5	17.5
$5 \leq x < 8$	8	6.5	52
$8 \leq x < 10$	16	9.	144
$10 \leq x < 20$	4	15	60

35

273.5
+ +

Work out an estimate for the mean amount of pocket money received by each pupil.

$$273.5 \div 35 = £7.81$$

(Total for Question 3 is 3 marks)

4   A number, n, is rounded to 2 significant figures. ± 0.5
The result is 26.
Complete the error interval for n

$$25.5 \leq n < 26.5$$

(Total for Question 4 is 2 marks)

5(a)   Margot is going to play one game of snooker and one game of pool.
The probability that Margot wins a game of snooker is 0.9.
The probability that Margot does not win a game of pool is 0.3.

Snooker   Pool

0·9   W

0·7   W

0·3   NW

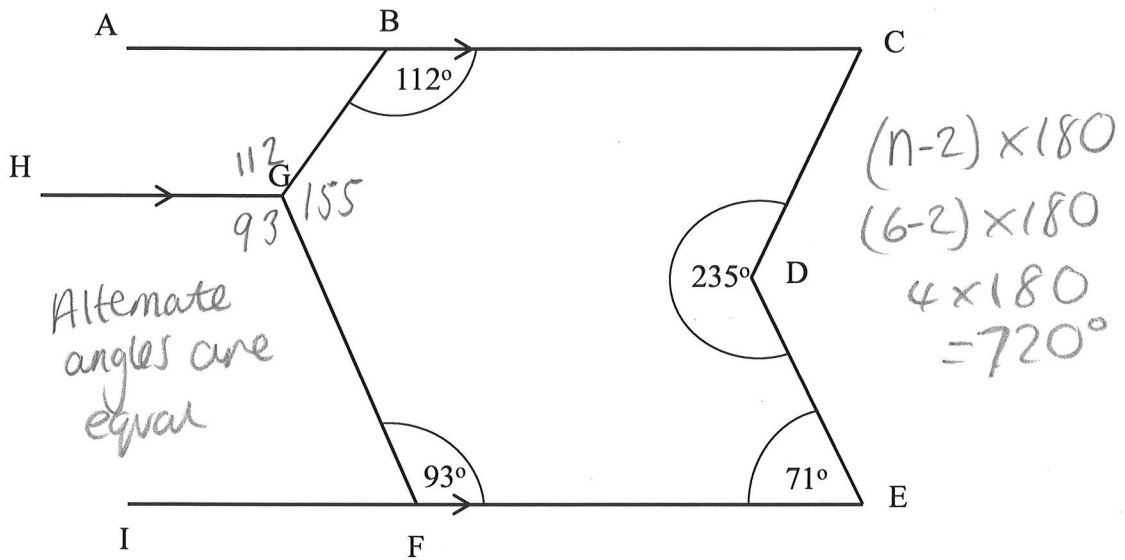0·1   NW

0·7   W

0·3   NW
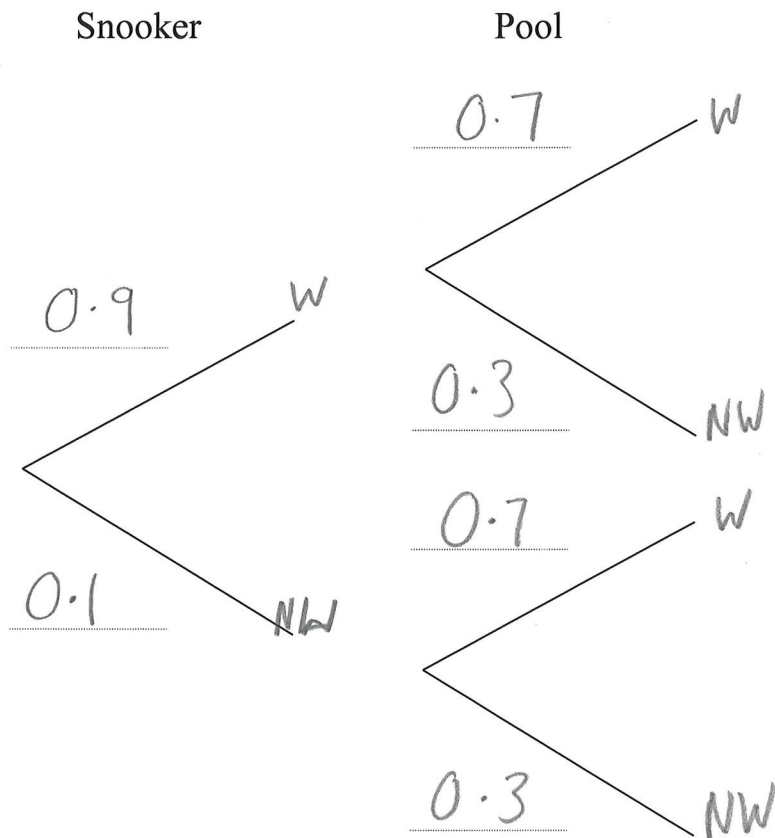
(2)

5(b)   Work out the probability that Margot wins at both snooker and pool.

$$0·9 \times 0·7 = 0·63$$

(2)

(Total for Question 5 is 4 marks)

6   Shape BCDEFG is an irregular hexagon.
     Lines AC, HG & IE are parallel.

A   B   C

                       112°

H   112 G
           93   155

     Alternate
     angles are
     equal

                     235° D

                                              $(n-2) \times 180$
                                              $(6-2) \times 180$
                                                 4×180
                                                  $= 720°$

                 93°   71°   E

     I   F

Work out the size of angle BCD

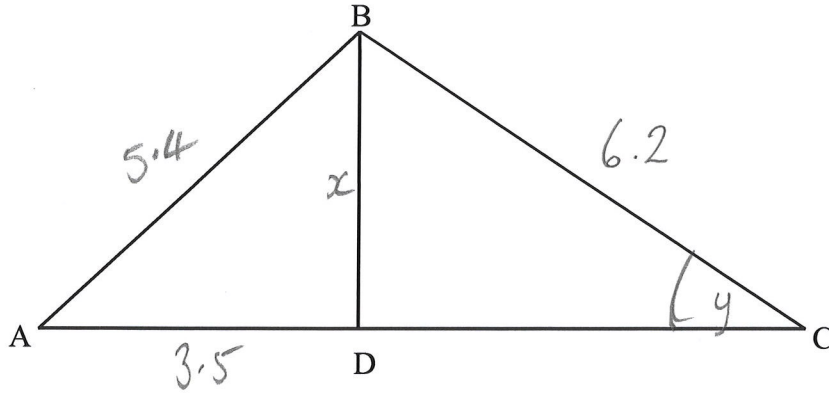$720 - 112 - 155 - 93 - 71 - 235 = \underline{\underline{54}}$

(Total for Question 6 is 5 marks)

7   Triangle ABC has been drawn below.
    AB = 5.4 cm
    BC = 6.2 cm
    AD = 3.5 cm

Work out the size of angle BCD

$$3.5^2 + x^2 = 5.4^2$$
$$12.25 + x^2 = 29.16$$
$$x^2 = 16.91$$
$$x = \sqrt{16.91}$$
$$x = 4.112$$

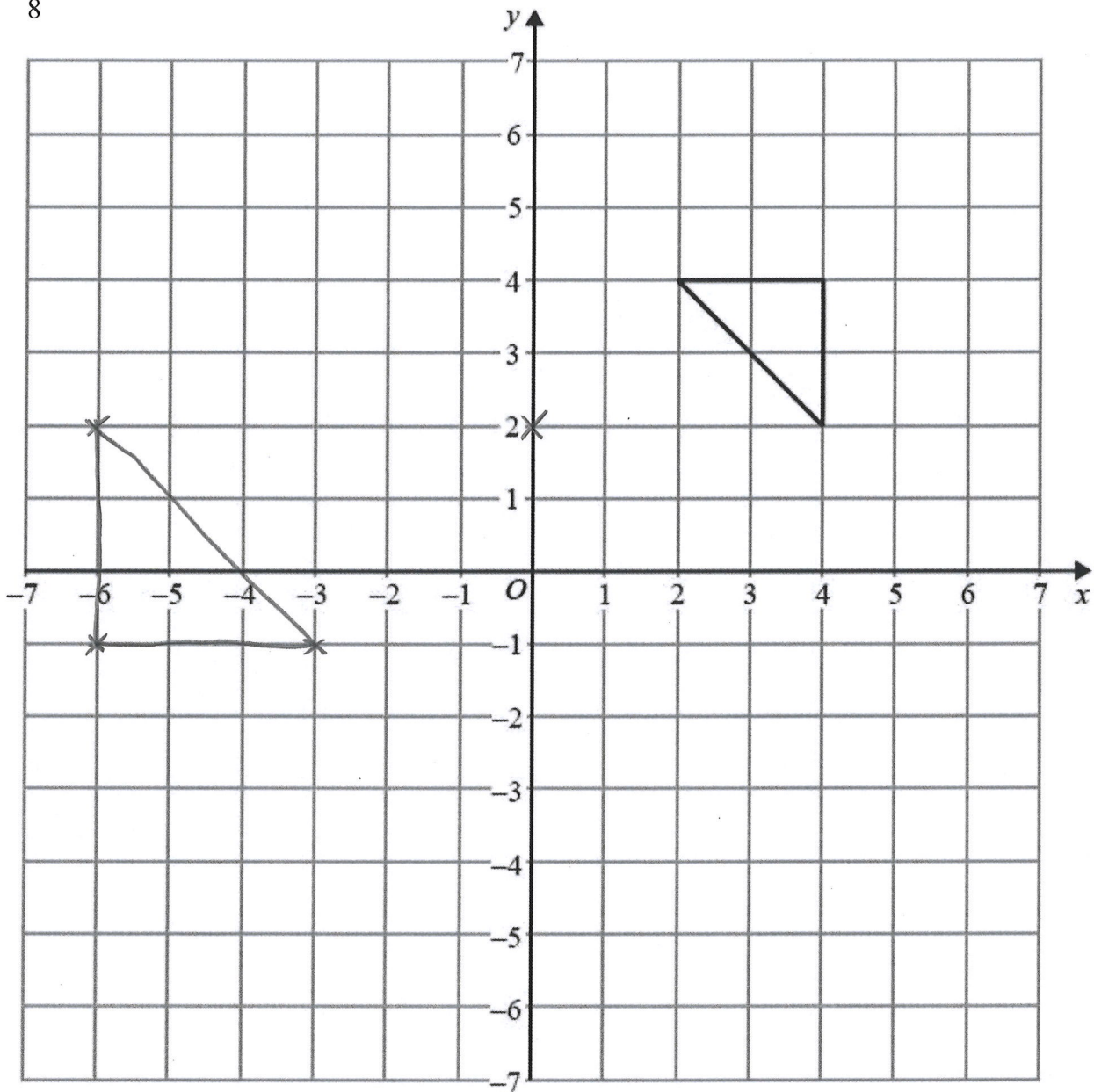$$\sin(y) = \frac{x}{6.2}$$
$$\sin(y) = \frac{4.112}{6.2}$$
$$y = \sin^{-1}\left(\frac{4.112}{6.2}\right)$$
$$y = 41.5°$$

o

(Total for Question 7 is 4 marks)

8

On the grid, enlarge the triangle by scale factor -1.5 with centre (0,2)

$-1.5 \begin{pmatrix} 4 \\ 0 \end{pmatrix} = \begin{pmatrix} -6 \\ 0 \end{pmatrix}$

$-1.5 \begin{pmatrix} 2 \\ 2 \end{pmatrix} = \begin{pmatrix} -3 \\ -3 \end{pmatrix}$

$-1.5 \begin{pmatrix} 4 \\ 2 \end{pmatrix} = \begin{pmatrix} -6 \\ -3 \end{pmatrix}$

(2)

(Total for Question 8 is 2 marks)

9   L_1 has the equation of $y = 3x - 8$
     L_2 has the equation of $4x + 12y = 96$

Sam says that the two lines are perpendicular.
Is she correct?

$$4x + 12y = 96$$

$$12y = -4x + 96$$

$$y = \frac{-4}{12}x + 8$$

$$y = -\frac{1}{3}x + 8$$

$3 \times \frac{-1}{3} = -1$

$\therefore$ perpendicular

$\underline{Yes}$

(Total for Question 9 is 3 marks)

10   y is directly proportional to x^3
      When y is 352 and x is 4.
      Work out the value of x when y is 148.5

$$y = K \times x^3$$

$$352 = K \times 4^3$$

$$352 = K \times 64$$

$$\frac{352}{64} = K$$

$$5.5 = K$$

$$y = 5.5 \times x^3$$

$$148.5 = 5.5 \times x^3$$

$$\frac{148.5}{5.5} = x^3$$

$$27 = x^3$$

$$\sqrt[3]{27} = x$$

$$3 = x$$

(Total for Question 10 is 3 marks)

11   The group frequency table gives information on the time taken, in minutes, for 80 students to complete their weekly maths homework.

Time (*t* minutes)	Frequency
$0 < t \leqslant 20$	5
$20 < t \leqslant 40$	30
$40 < t \leqslant 60$	20
$60 < t \leqslant 80$	15
$80 < t \leqslant 100$	8
$100 < t \leqslant 120$	2

11(a)   Complete the cumulative frequency table

Time (*t* minutes)	Cumulative frequency
$0 < t \leqslant 20$	5
$0 < t \leqslant 40$	35
$0 < t \leqslant 60$	55
$0 < t \leqslant 80$	70
$0 < t \leqslant 100$	78
$0 < t \leqslant 120$	80

(1)

11(b)   On the grid, draw the cumulative frequency graph for this information

(2)
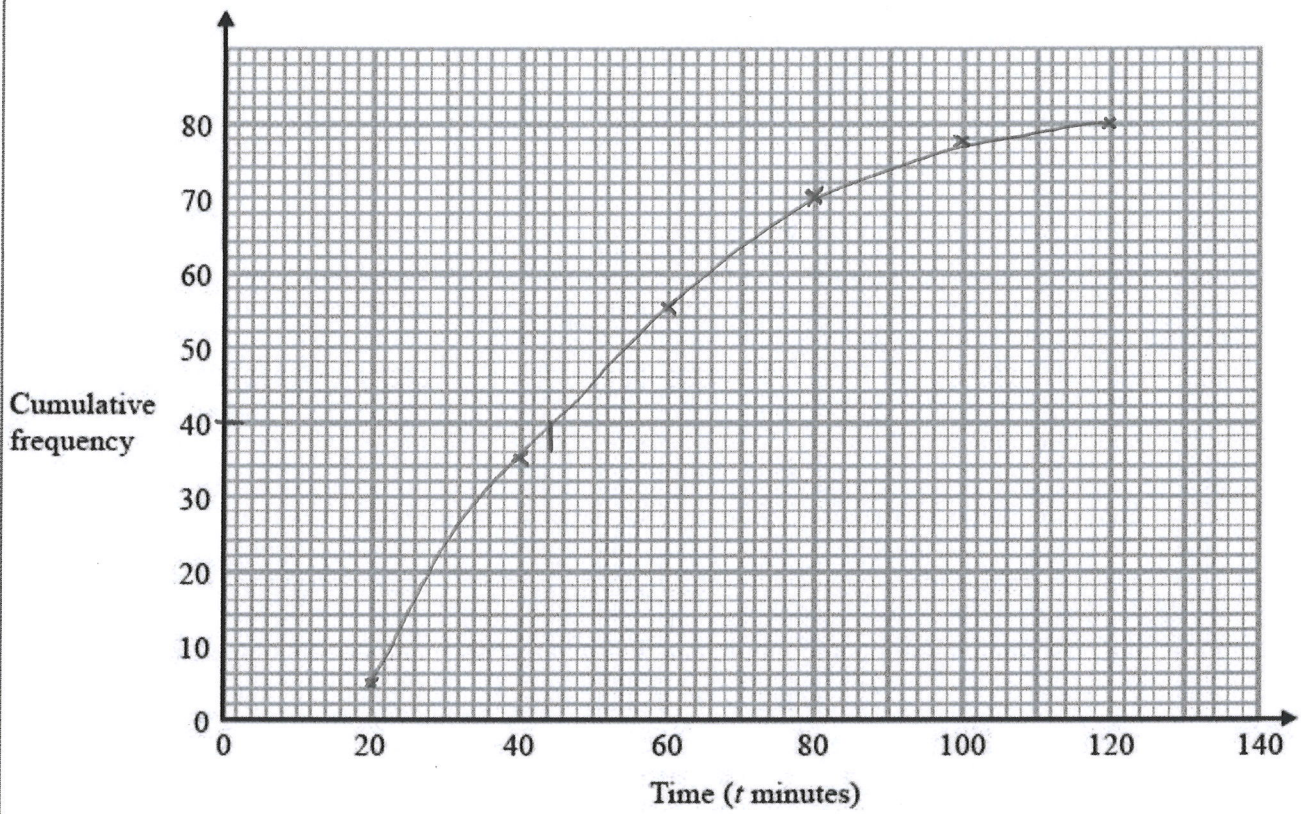
11(c)   Using your graph, work out an estimate for the median time taken.

44

....

(1)

(Total for Question 11 is 4 marks)

12   PQR and QRS are triangles
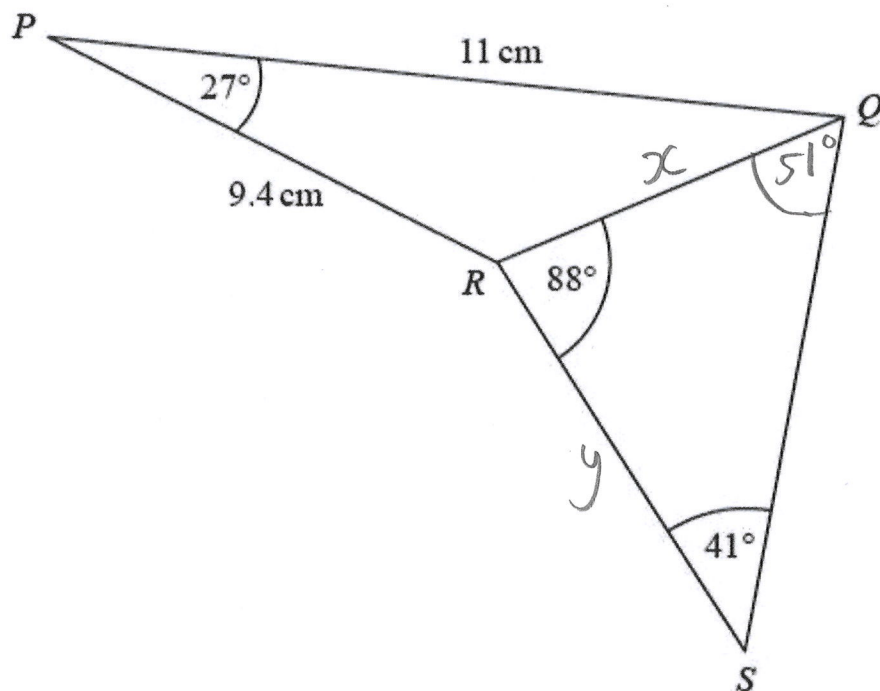
Calculate the length of RS.
Give your answer correct to 3 significant figures.
You must show all of your working

$$a = \sqrt{11^2 + 9.4^2 - 2 \times 11 \times 9.4 \times \cos(27)}$$
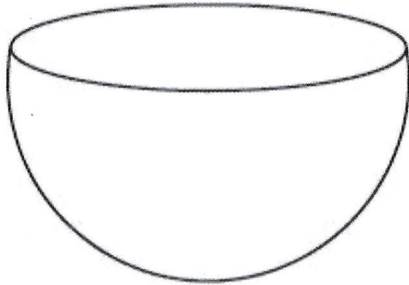
$$a = 5.01$$

$$\frac{y}{\sin(51)} = \frac{5.01}{\sin(41)}$$
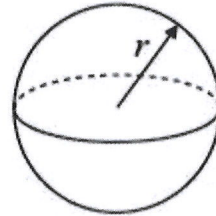
$$y = \frac{5.01}{\sin(41)} \times \sin(51) = 5.93$$

.... cm

(Total for Question 12 is 4 marks)

13   The diagram shows a solid hemisphere

Volume of sphere $= \dfrac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

(a)   The diameter of the sphere is 12.3cm.   radius $= 6.15$
       Work out the volume of the hemisphere.

$$\frac{1}{2} \times \frac{4}{3} \times \pi \times 6.15^3 = 487.17 cm^3$$

(2)

(b)   Maggie says that 300cm² is the same value as 3000mm².
       Is Maggie correct. Give a reason for your answer.

NO cm² → mm² = $\times 10^2$

$300 \times 10^2 = 30,000$

(1)

(Total for Question 13 is 4 marks)

14 Katie has a pond containing some fish.
On Monday, she catches 45 fish and places a tag on them.
On Tuesday, she catches 240 fish, 18 of the fish have a tag on them.

Work out an estimate for the total number of fish in the pond.

$$\frac{45}{x} = \frac{18}{240}$$

×2.5

×2.5

600

(Total for Question 14 is 2 marks)

15 The population of grey squirrels in Garstang in 2024 is 12,000.
Population growth is given by the following iterative formula
$$P_{n+1} = 1.04P_n + 180$$

Work out an estimate for the number of grey squirrels in Garstang in
2025, 2026 and 2027
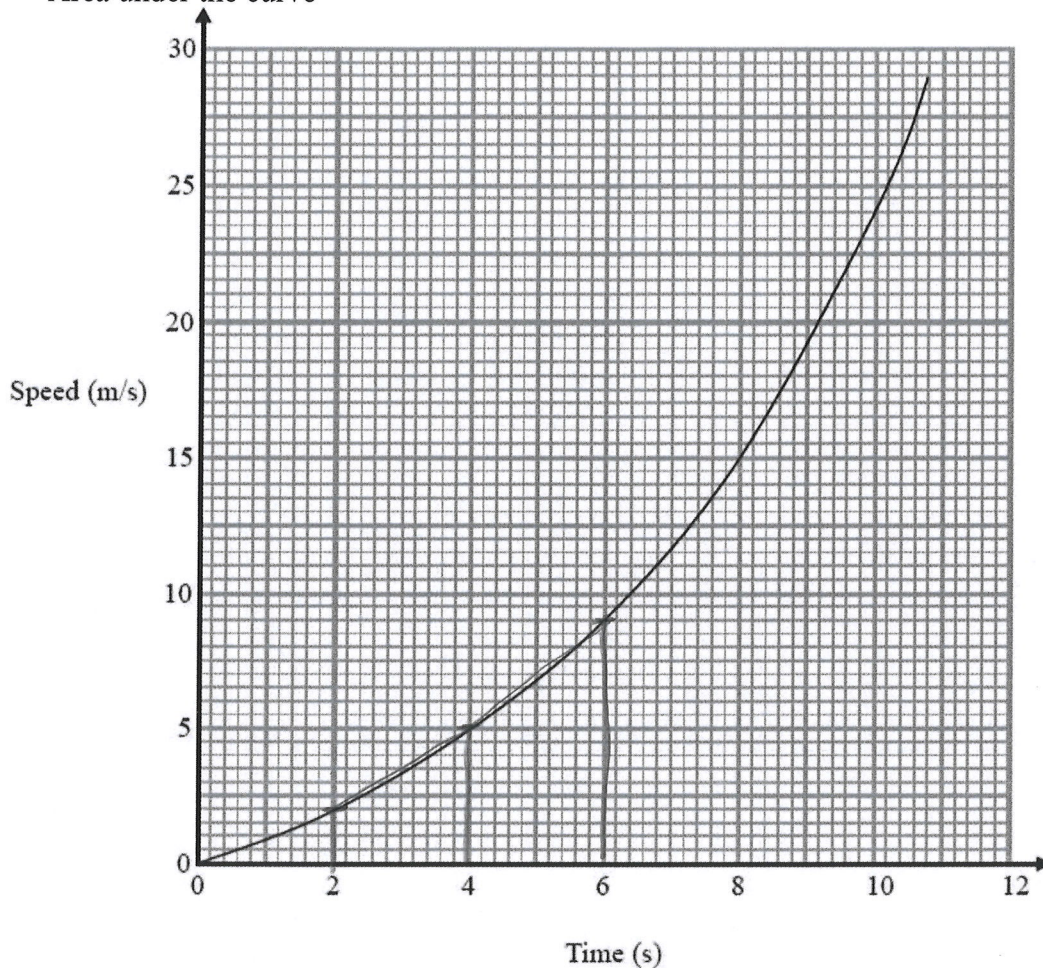
12,000 = ANS

= 1.04(ANS) +180

2025   12660

2026   13346

2027   14060

(Total for Question 15 is 3 marks)

16   Area under the curve

(a) Work out an estimate for the distance the car travelled in the first 6 seconds.

$$\left(\frac{2 \times 2}{2}\right) + \left(\frac{2+5}{2} \times 2\right) + \left(\frac{5+9}{2} \times 2\right)$$

$$2 + 7 + 14 = 23m$$

(3)

(b) Is your answer to part (a) an underestimate or overestimate? Give reasons for your answer

overestimate, as I included area
above the curve.

(1)

(Total for Question 16 is 4 marks)

17   Solve

$$\frac{20x^2 - 4x}{20x^2 - 4x} = 1$$

$$\frac{2x + 4}{5x - 1} + \frac{x + 3}{4x} - 1 = 4$$

Give your answers correct to 3 significant figures

$$\frac{4x(2x+4) + (x+3)(5x-1)}{4x(5x-1)} = \frac{8x^2 + 16x + 5x^2 + 14x - 3}{20x^2 - 4x}$$

$$\frac{13x^2 + 30x - 3}{20x^2 - 4x} - \frac{20x^2 - 4x}{20x^2 - 4x} = \frac{-7x^2 + 34x - 3}{20x^2 - 4x}$$

$$\frac{-7x^2 + 34x - 3}{20x^2 - 4x} = 4$$

$$-7x^2 + 34x - 3 = 80x^2 - 16x$$

$$0 = 87x^2 - 50x + 3$$

$$a = 87 \quad b = -50 \quad c = 3$$

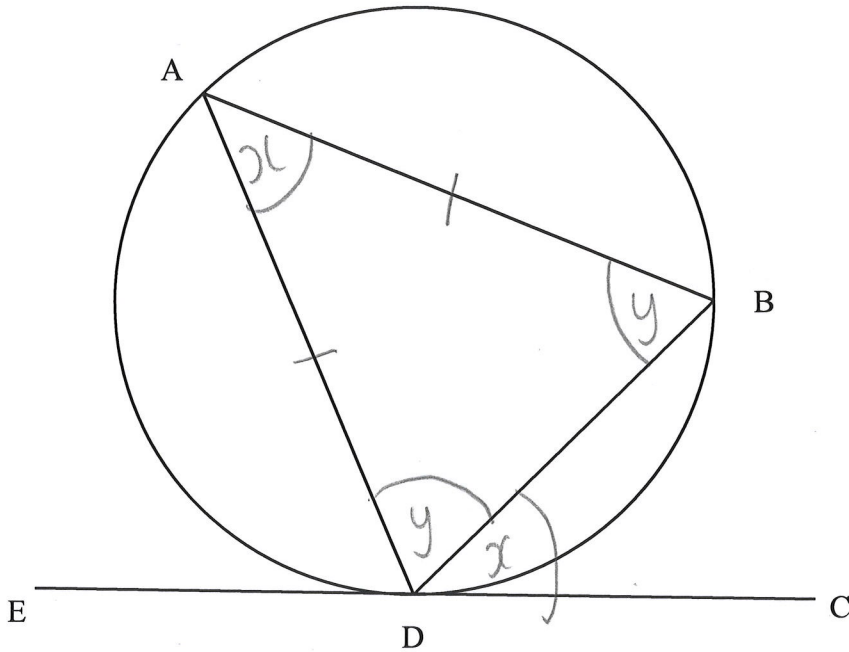$$\frac{50 \pm \sqrt{(-50)^2 - (4 \times 87 \times 3)}}{2 \times 87}$$

$$x = 0.0681$$

$$x = 0.507$$

Points ABD are on a circle such that:

AB = AD

Angle ABD = y^o

Angle BDC = x^o

Show that $\frac{1}{2}x + y = 90$

Give reasons for your answer

$$x + 2y = 180$$
$$\frac{1}{2}x + y = 90$$

$\Big) \div 2$

- Alternate segment theorem
- Base angles of an isosceles triangle are equal.

(Total for Question 18 is 4 marks)

19    $f(x) = 3x^2 - 2$ $g(x) = 2x + 3$

(a)   Find fg(2)

$2(2) + 3 = 7$

$3(7)^2 - 2 = 145$

(2)

(b)   Find $f^{-1}(x)$

$y = 3x^2 - 2$

$x = 3y^2 - 2$

$x + 2 = 3y^2$

$\sqrt{\dfrac{x+2}{3}} = y$

$f^{-1}(x) = \sqrt{\dfrac{x+2}{3}}$

(2)

(c)   Solve $fg(x) = g^{-1}(21)$

$3(2x+3)^2 - 2 = \dfrac{(21)-3}{2}$

$3(4x^2 + 12x + 9) - 2 = 9$

$12x^2 + 36x + 27 - 2 = 9$

$12x^2 + 36x + 25 = 9$

$12x^2 + 36x + 16 = 0$

$a = 12 \quad b = 36 \quad c = 16$

$\dfrac{-36 \pm \sqrt{(36)^2 - (4 \times 12 \times 16)}}{2 \times 24}$

$y = 2x + 3$

$x = 2y + 3$

$\dfrac{x-3}{2} = y$

$\dfrac{x-3}{2} = g^{-1}(x)$

$x = -0.543$

$x = -2.457$

(4)

(Total for Question 19 is 8 marks)

20   Solve $2x^2 + 9x - 35 > 0$

$a = 2 \qquad b = 9 \qquad c = -35$

$$\frac{-9 \pm \sqrt{(9)^2 - (4 \times 2 \times -35)}}{2 \times 2}$$

$x = -7 \qquad x = 2.5$

$x < -7 \quad \text{and} \quad x > 2.5$

(Total for Question 20 is 3 marks)

21   At the point that star A, star B and star C are stationery, they form a triangle.
The distance between star A and the star B is 1.8×10^5 km to the nearest 10,000 km
The distance between star A and the star C is 1.6×10^5 km to the nearest 10,000 km
The distance between the star B and the star C is 1.5×10^5 km to the nearest 10,000 km

Find the upper bound of the area of the triangle created between Star A, Star B and Star C.
Giving your answer in standard form correct to 3 significant figures.

A

165000 x 185000
160000   180000
155000   175000

C   B

150000
145000   155000
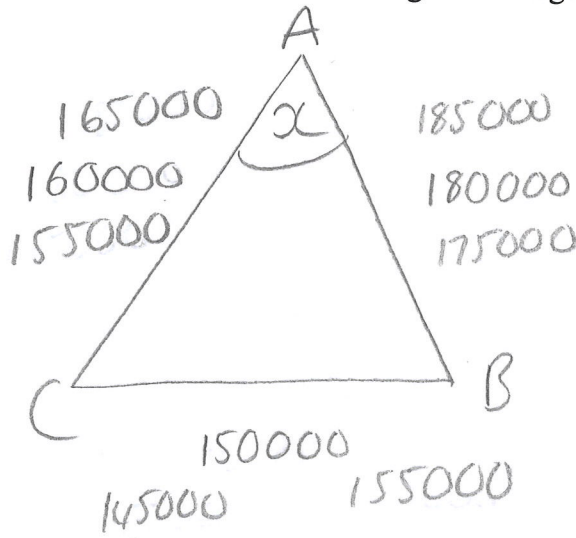
$$x = \cos^{-1}\left(\frac{155000^2 + 175000^2 - 155000^2}{2 \times 165000 \times 185000} \right)$$

$$x = 59.89°$$

$$\text{Area} = \frac{1}{2} \times 185000 \times 165000 \times \sin(59.89)$$

$$= 1.32 \times 10^{10}$$

(Total for Question 21 is 6 marks)

Total for this paper is 80 marks