Name:

GCSE Maths 2022
Edexcel Higher Paper 3
Set B
Non-Calculator

Corbettmaths

Equipment

1. A black ink ball-point pen.
2. A pencil.
3. An eraser.
4. A ruler.
5. A pair of compasses.
6. A protractor.

Answers

Guidance

1. Read each question carefully.
2. Check your answers seem right.
3. Always show your workings

Information

1. This paper has been created based on topics in the Advance Information.
2. Also see Corbettmaths for the checklist for the entire GCSE as these topics may still be useful for Paper 1
3. There is one question per topic - this paper is designed to give an opportunity to practice each topic rather than replicate the actual paper.
4. The marks for questions are shown in brackets

GCSE 2022 Resources

1. (a) $c^4 \times c^n = c^8$

Work out the value of n

4

.....

(1)

(b) $\frac{y^{12}}{y^4} = y^m$

Work out the value of m

8

.....

(1)

(c) $(a^n)^4 = \frac{(a^3)^6}{a^7}$

$a^{4n} = \frac{a^{18}}{a^7}$

$a^{4n} = a^{11}$

$4n = 11$

$n =$ 2.75

.....

(3)

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2. A vintage car was bought for £9,400
Since then the value of the car has increased by 29%

Calculate the value of the car.

$9400 \times 1.29 =$

£ 12126

.....

(2)

3. An empty bucket weighs 800g.
The weight of the bucket increases to 2.1kg when filled with water.

Calculate the percentage increase in the weight of the bucket.
Give your answer to two significant figures.

$\frac{1300}{800} \times 100 = 162.5$

160 ..... %

(3)

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4. Charlotte invests £5000.
The bank pays 10% interest for the first year and then y% every year after that.
After three years, Charlotte has £5610.55

Calculate y.

$5610.55 \div 5500 = 1.0201$

1st year → £5500

5500 $\xrightarrow{\times a}$ $\xrightarrow{\times a}$ = 5610.55

$a^2 = 1.0201$

$a = 1.01$

1% ..... %

(3)

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5. There are 1500 people at an ice hockey match.
The announcer says that this is exactly 30% more people than the previous match.

Let previous match = y people.

Explain why the announcer is wrong.

$y \times 1.3 = 1500$

$y = 1153.846153..$

If it was exactly 30%, then y would be a whole number.

(2)

6. Write $0.3\dot{9}\dot{0}$ as a fraction.

Give your answer in its simplest form.

$x = 0.3909090...$

$10x = 3.909090...$

$1000x = 390.9090...$

$990x = 387$

$x = \frac{387}{990}$

$\frac{43}{110}$

.....

(3)

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7. Harley sold 380 ice creams.
He sold only vanilla, chocolate, strawberry and honeycomb ice creams.
45% of the ice creams are chocolate.

The ratio of vanilla ice creams to strawberry ice creams to honeycomb ice creams is 1:2:8.

Work out how many more chocolate ice creams are sold than honeycomb ice cream.

$0.45 \times 380 = 171$ chocolate.

209 remaining.

$1+2+8 = 11$

$209 \div 11 = 19$

$8 \times 19 = 152$ honeycomb

$171 - 152 = 19$

19

.....

(4)

8. A is directly proportional to the cube root of B.
B is increased by 60%. $\times 1.6$

Work out the percentage increase in A.

$A \propto \sqrt[3]{B}$

$A = k \times \sqrt[3]{B}$

↓ increase B by 60%

$A = k \times \sqrt[3]{1.6B}$

$A = k \times \sqrt[3]{1.6} \times \sqrt[3]{B}$ $\quad A = 1.1696\ldots k \times \sqrt[3]{B}$

↑

1.1696...

16.96 %

(3)

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9. 12 builders can finish a house in 20 days. $20 \times 12 = 240$
Each of the builders works at the same rate.
9 of the builders stop working after 14 days.
The other builders continue building the house at the same rate until it is finished.

How long does it take to build the house?

$12 \times 14 = 168$

$240 - 168 = 72$

$72 \div 3 = 24$ days

$24 + 14$

38 days

(3)

10. The curved surface area of a cone is given by the formula

$$A = \pi rl$$

where A is the curved surface area
r is the radius of the base of the cone
and l is the slant height

220.5 / 219.5

Given A = 220 cm² correct to 3 significant figures,
and r = 8 cm correct to 1 significant figure.

7.5 / 8.5

Calculate the upper bound for l.

$l = \frac{A}{\pi r}$

$\text{Max } l = \frac{\text{Max } A}{\text{Min } \pi r}$

$\text{Max } l = \frac{220.5}{\pi \times 7.5}$

$= 9.358831...$

9.3583 .....cm

(3)

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11. A food standards inspector is going to visit 3 establishments in one day.
In the town, there are 40 restaurants and 12 cafes.

He writes a list of the three different establishments, and the order will either be:

12	Cafe	Restaurant	40
40	Restaurant	Cafe	12
39	Restaurant	Cafe	11

How many possible lists could he write?

CRR : $12 \times 40 \times 39 = 18720$

RCC : $40 \times 12 \times 11 = 5280$

24000 .....

(3)

12. Shown is a list of locations and their elevations

Location	Elevation
Coachella	-22 metres
Bern	542 metres
Jericho	-258 metres
Baku	-28 metres
Lake Eyre	-16 metres
Tokyo	17 metres

Work out the difference in Baku's and Tokyo's elevations

$17 - -28$

45 .....m

(2)

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13. Expand and simplify $9(2y - 1) - 3(y + 4)$

$18y - 9 - 3y - 12$

$15y - 21$

$15y - 21$ .....

(2)

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14. Expand and simplify fully $(y + 1)(y - 4)(y + 2)$

$(y^2 - 4y + y - 4)(y + 2)$

$(y^2 - 3y - 4)(y + 2)$

$y^3 - 3y^2 - 4y + 2y^2 - 6y - 8$

$y^3 - y^2 - 10y - 8$ .....

(3)

15. Factorise fully $3x^2 - 75$

$3(x^2 - 25)$

$3(x-5)(x+5)$

.....

(2)

16. Solve

$$\frac{10x - 3}{3} + \frac{5x + 2}{4} = 5$$

You must show your working.

$\frac{40x - 12}{12} + \frac{15x + 6}{12} = 5$

$55x - 6 = 60$

$55x = 66$

$x = \frac{66}{55}$

x = $\frac{6}{5}$

(4)

17. $M = 4ac^2$

$a = 9.2 \times 10^{-6}$ and $c = 7.8 \times 10^4$

Work out the value of M

Give your answer in standard form correct to 2 significant figures.

$M = 4 \times (9.2 \times 10^{-6}) \times (7.8 \times 10^4)^2$

$= 223891.2$

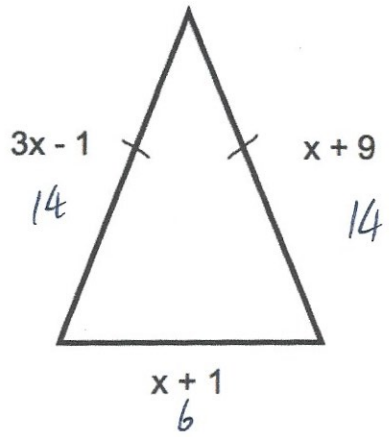
$= 220000$ to 2sf

2.2×10^5

M = 2.2×10^5

(2)

18. Shown below is an isosceles triangle. Each side is measured in centimetres.



14
14
6

Calculate the perimeter of the triangle.

$3x - 1 = x + 9$

$2x = 10$

$x = 5$

34

.....cm

(4)

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19. Make m the subject of the formula

$$y = \frac{m + 4}{m + 5}$$

$y(m+5) = m+4$

$my + 5y = m + 4$

$my - m = 4 - 5y$

$m(y-1) = 4 - 5y$

$m = \frac{4-5y}{y-1}$

m = $\frac{4-5y}{y-1}$

(3)

$x_1\ y_1 \quad x_2\ y_2$

20. The line passing through (1, p) and (5, 1) has a gradient of $\frac{3}{4}$

Find the value of p.

$$\frac{1-p}{5-1} = \frac{3}{4}$$

$$\frac{1-p}{4} = \frac{3}{4}$$

$$\therefore \quad 1-p = 3$$

$$p = -2$$

-2

.....

(3)

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21. Solve the simultaneous equations

$$x^2 + y^2 = 1$$
$$x + 2y = 1$$

$$x = 1 - 2y$$

$$(1-2y)^2 + y^2 = 1$$

$$(1-2y)(1-2y) + y^2 = 1$$

$$1 - 4y + 4y^2 + y^2 = 1$$

$$5y^2 - 4y = 0$$

$$y(5y - 4) = 0$$

$$y = 0 \quad \text{or} \quad y = \frac{4}{5}$$

$$x = 1 \quad \text{or} \quad x = -\frac{3}{5}$$

.....

(5)

22. The amount of money at the start of year t is A_t
The amount of money in the bank account at the start of year 1 is £5000

Given that

$$A_{t+1} = 1.02A_t$$

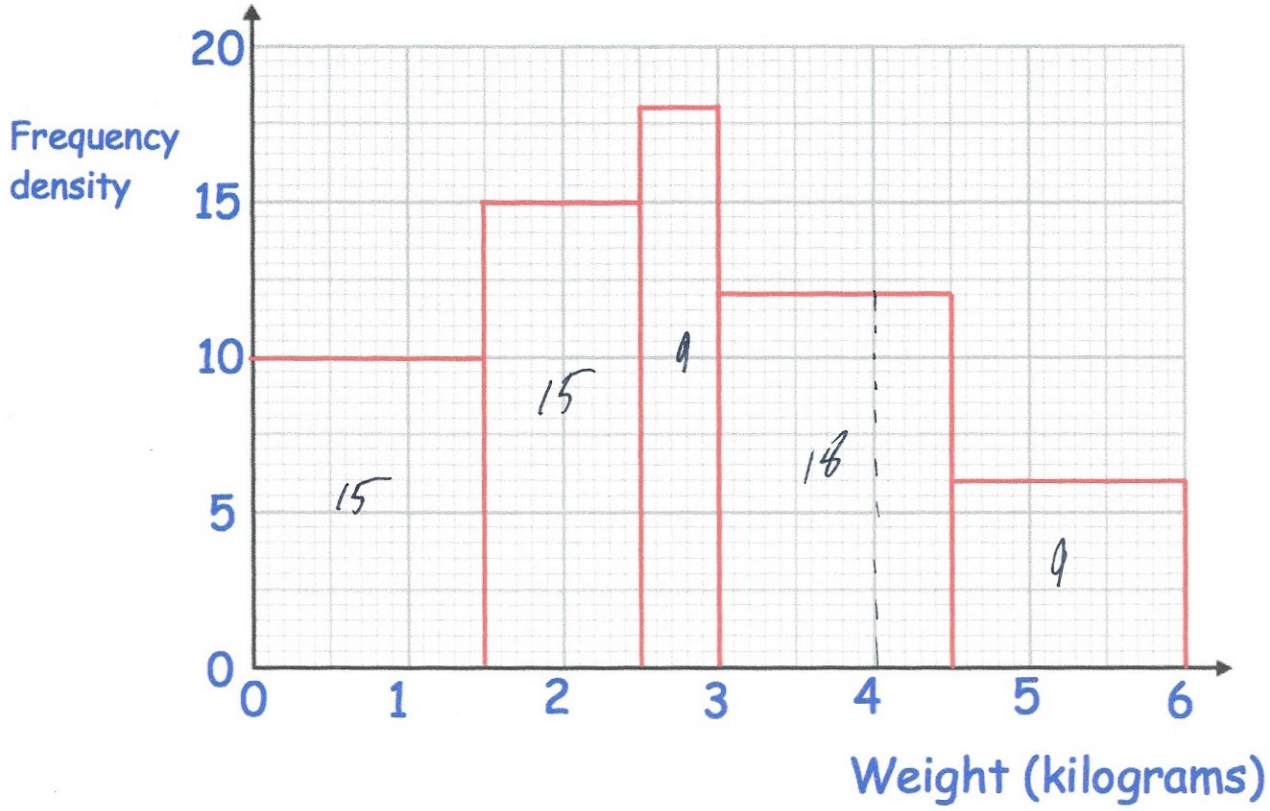
work out the amount of money in the bank account at the start of year 4.

start of year	Amount
1	5000
2	5100
3	5202
4	5306.04

£ 5306.04

(3)

23. Below is a histogram showing information about the weight of 66 parcels.



⅓ of the parcels which weighed between 2.5kg and 4kg were sent to Scotland

Work out an estimate for the number of parcels sent to Scotland.

$9 + 12 = 21$

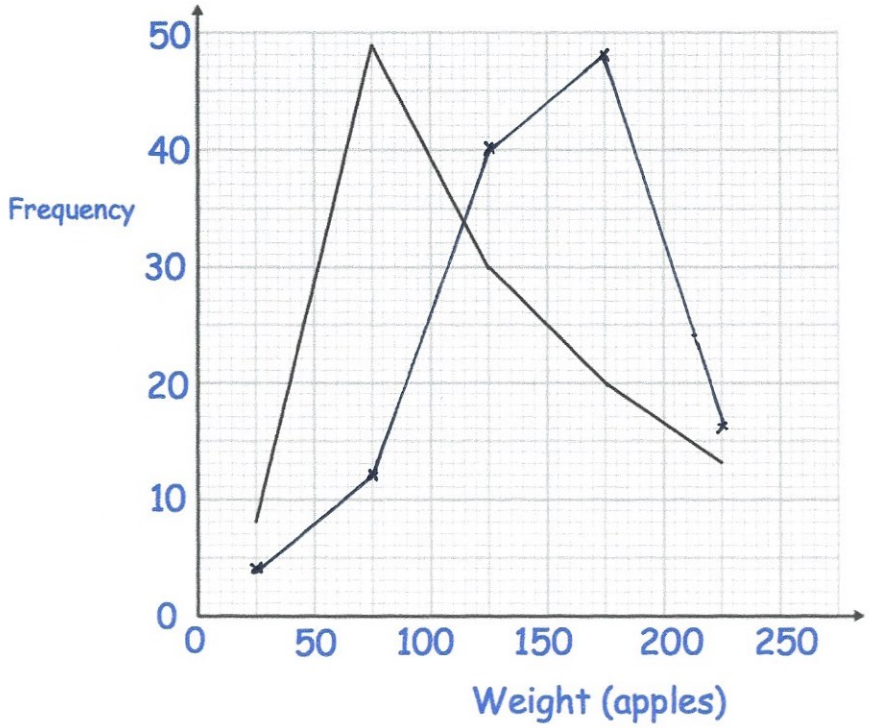
$\frac{1}{3}$ of $21 = 7$

7

.....

(3)

24. The frequency polygon shows the weights of 120 red apples.



The table shows the weights of 120 green apples.

Weight (kg)	Frequency
$0 < w \leq 50$	4
$50 < w \leq 100$	12
$100 < w \leq 150$	40
$150 < w \leq 200$	48
$200 < w \leq 250$	16

(a) Draw a frequency polygon to show this information on the diagram above.

(2)

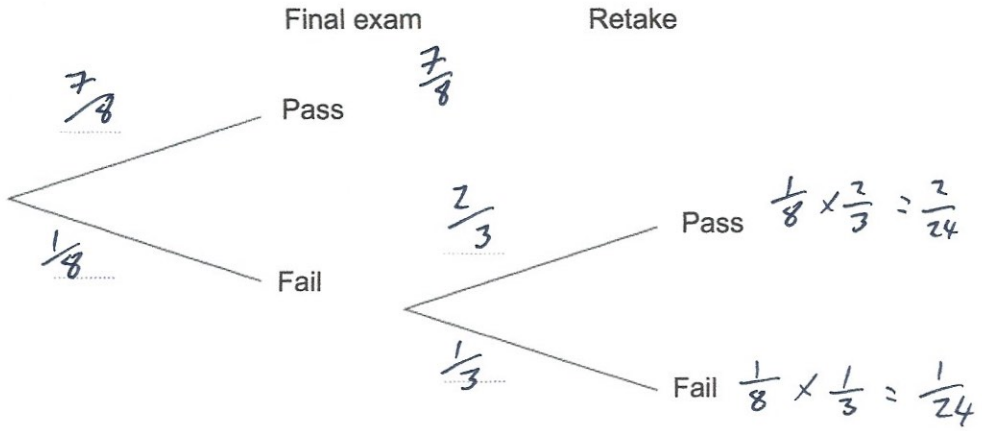
(b) Compare the two distributions.

The weights of the green apples are heavier as their frequency polygon (distribution) is skewed to the right (or further to the right).

(2)

25. A college course consists of 8 weeks of teaching with a final exam at the end of the course

If a student fails the final exam, they have one opportunity to retake the exam.
The probability of a student passing the final exam is $\frac{7}{8}$
The probability of a student passing the retake is $\frac{2}{3}$



(a) Complete the tree diagram

(2)

If a student passes the final exam or retake, they receive a certificate.

(b) Work out the probability that a student receives a certificate.

$1 - \frac{1}{24} = \frac{23}{24}$

or

$\frac{7}{8} + \frac{2}{24}$

$\frac{21}{24} + \frac{2}{24} = \frac{23}{24}$

$\frac{23}{24}$

.....

(2)

26. There are x apples in a crate.
4 of the apples are bad.

Fiona chooses two apples from the crate, without replacement.
The probability she selects two bad apples is $1/11$

(a) Prove $x^2 - x - 132 = 0$

$\frac{4}{x} \times \frac{3}{x-1} = \frac{1}{11}$

$\frac{12}{x^2-x} = \frac{1}{11}$

$x^2 - x = 132$

$x^2 - x - 132 = 0$

(3)

(b) Find x, the number of apples in the crate.

$(x - 12)(x + 11) = 0$

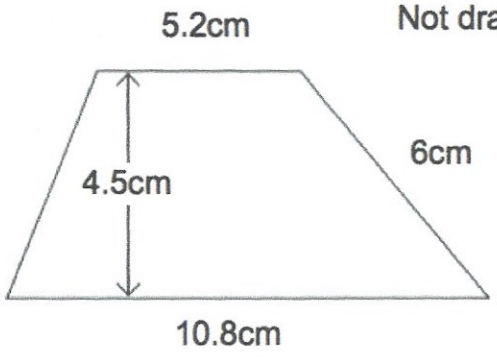
$x = 12$ ✓ or $x = -11$ ×

12

.....

(2)

27.



Calculate the area of the trapezium.

$\frac{1}{2}(5.2 + 10.8) \times 4.5$

$\frac{1}{2}(16) \times 4.5 = 36$

36 .....cm²

(2)

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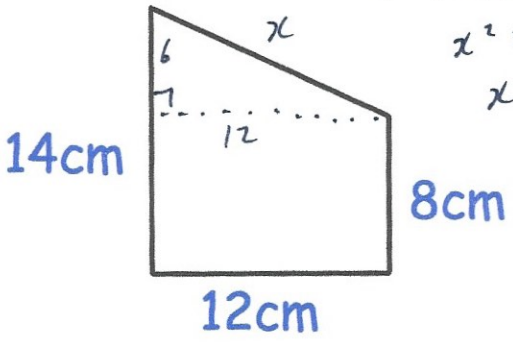
28. A frame is made from wire.
The frame is a trapezium.



$6^2 + 12^2 = x^2$

$36 + 144 = x^2$

$x^2 = 180$

$x = 13.4164$

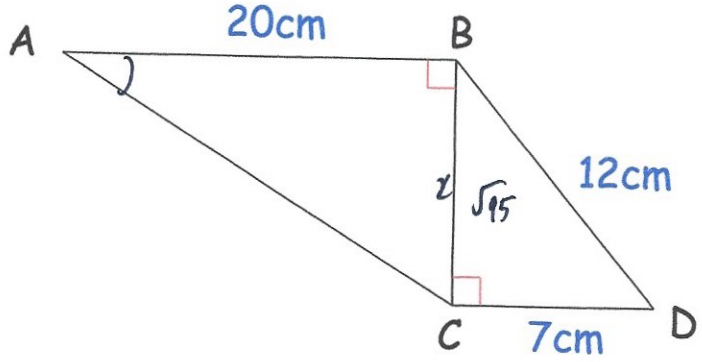
Calculate the total amount of wire needed to make the frame.

$14 + 12 + 8 + 13.4164 = 47.4164$

47.4164 .....cm

(3)

29.



Work out the size of angle CAB

$x^2 + 7^2 = 12^2$

$x^2 = 95$

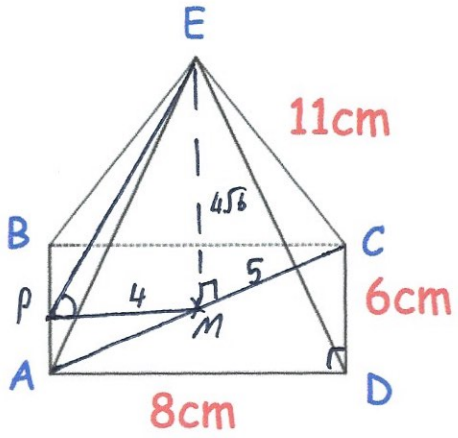
$x = \sqrt{95}$

$\tan CAB = \frac{\sqrt{95}}{20}$

25.982°

(4)

30. Shown below is a rectangular-based pyramid.
The apex E is directly over the centre of the base.



AD = 8cm
CD = 6cm
CE = 11cm

(a) Calculate the height of the pyramid

$AC^2 = 6^2 + 8^2$

$AC^2 = 100$

$AC = 10$

$CM = AM = 5$ cm

$EM^2 + 5^2 = 11^2$

$EM^2 = 96$

$EM = 4\sqrt{6}$

9.798 .....cm
(3)

(b) Calculate the angle between face ABE and the based ABCD

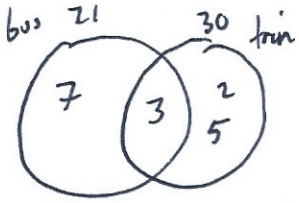
$\tan \angle PME = \frac{4\sqrt{6}}{4}$

$\tan^{-1} \frac{4\sqrt{6}}{4} = 67.79$

67.79 .....°
(3)

31. A bus leaves Antrim every 21 minutes 3×7
A train leaves Antrim every 30 minutes $2 \times 3 \times 5$
At 6am, a bus and a train leave Antrim at the same time.

What is the next time that a bus and a train leave at the same time?



$LCM = 2 \times 3 \times 5 \times 7 = 210$

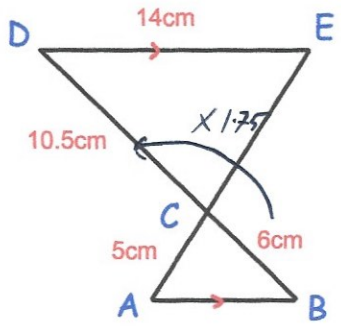
3 hr 30 min

9:30am

.....

(3)

32.



$\frac{10.5}{6} = 1.75$

ACE and BCD are straight lines.
DE is parallel to AB.

(a) Work out the size of CE.

$5 \times 1.75 = 8.75$

8.75 .....cm

(3)

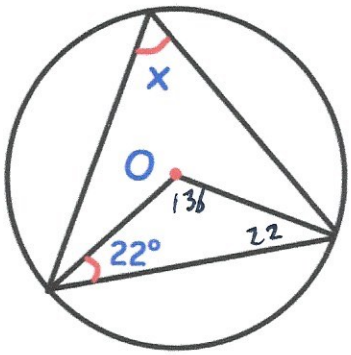
(b) Work out the size of AB.

$14 \div 1.75$

8 .....cm

(3)

33.

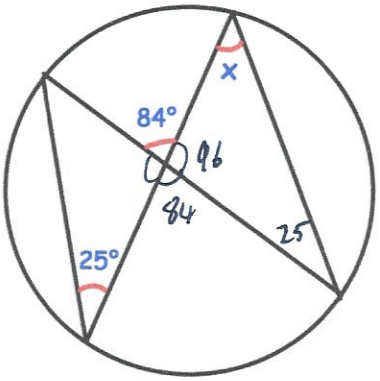


(a) Work out the size of angle x above.

$136 \div 2 =$

68 °

(2)



(b) Work out the size of angle x above.

$360 - 84 - 84 = 192$

$192 \div 2 = 96$

$180 - 96 - 25 =$

59 °

(2)

34. $\mathbf{a} = \begin{pmatrix} 7 \\ p \end{pmatrix}$ $\mathbf{b} = \begin{pmatrix} q \\ -5 \end{pmatrix}$

Given $7\mathbf{a} - 2\mathbf{b} = \begin{pmatrix} 50 \\ 1.25 \end{pmatrix}$

Work out the values of p and q.

$\begin{pmatrix} 49 \\ 7p \end{pmatrix} - \begin{pmatrix} 2q \\ -10 \end{pmatrix} = \begin{pmatrix} 49 - 2q \\ 7p + 10 \end{pmatrix}$

$49 - 2q = 50$

$-2q = 1$

$q = -\frac{1}{2}$

$7p + 10 = 1.25$

$7p = -8.75$

$p = -1.25$

p = -1.25 q = -0.5

(2)

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35. The distance of the moon to the Earth is 384,400 km. 384400000 m
The speed of light is 2.998×10^8 m/s.

Work out how long it will take light to travel from the moon to the Earth.
Include suitable units.

$s \quad d \quad t$

$t = \frac{d}{s}$

$t = \frac{384400000}{2.998 \times 10^8} = 1.282$ seconds

1.282 seconds

(3)