

4H

Pearson Edexcel
International GCSE

EDEXCEL

IGCSE

MATHEMATICS A

SOLUTIONS

JANUARY 2016

4MA0/4H

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The methods used in these solutions, where relevant, are methods which have been successfully used with students. The method shown for a particular question is not always the only method and We do not claim that the method we have used is necessarily the most efficient or ‘best’ method. We will, from time to time, update a solution to show a different method if We feel that it is a good idea to do so.

Sometimes a method used in these solutions might be unfamiliar to You. If You are able to use a different method to obtain the correct answer then We would usually recommend that You keep using your existing method and not change to the method that We have used here. However, the choice of method is always up to You and We believe that it is often useful if You know more than one method to solve a particular type of problem.

Within these solutions We have indicated where marks **might** be awarded for each question. We have used B marks, M marks and A marks in a similar, but **not identical**, way that the exam board uses these marks within their mark schemes. We have done this for simplicity and convenience. We have sometimes interchanged B marks, M marks and A marks and We have sometimes awarded the marks in different ways to the exam board.

B1 - This is an unconditional accuracy mark (the specific number, word or phrase must be seen. This type of mark cannot be given as a result of ‘follow through’).

M1 - This is a method mark. We have indicated where method marks might be awarded for the method that is shown. If You use a different method, then the same number of method marks would be awarded but We are not able to indicate for what the marks would be awarded for Your particular method. When appropriate, You should seek clarity and download the relevant examiner mark scheme from the exam board’s web site

A1 - These are accuracy marks. Accuracy marks are typically awarded after method marks. If the correct answer is obtained, then You should normally (but not always) expect to be awarded all of the method marks (provided that You have shown Your method) and all of the accuracy marks.

(a) Work out the value of $\frac{\sqrt{4.6}}{8.1 - 3.7}$

Give your answer as a decimal.

Write down all the figures on your calculator display.

(A2)

0.48744569

(2)

(b) Write your answer to part (a) correct to 3 significant figures.

(A1)

0.487

(1)

$$D = 3e^2 + 4e$$

Work out the value of D when $e = -5$

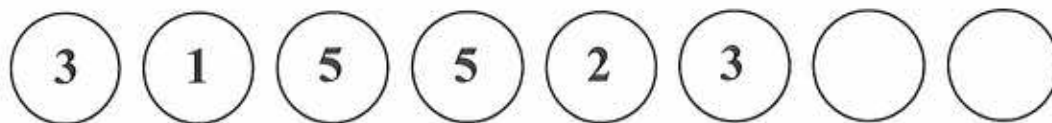
$$D = 3(-5)^2 + 4(-5) \quad \text{(M1)}$$

$$D = \underline{\quad 55 \quad} \quad \text{(A1)}$$

Here are 8 cards.

There is a number on each of six cards.

Two cards are blank.



Uzma wants the mean of the numbers on the 8 cards to be 4

She wants the range of the numbers on the 8 cards to be 9

Find the numbers that she should write on the two blank cards.

$$\text{TOTAL NEEDS TO BE } 8 \times 4 = 32 \quad (\text{BI})$$

$$\text{CURRENT TOTAL IS } 3 + 1 + 5 + \dots = 19 \quad (\text{BI})$$

$$\therefore \text{LAST TWO MUST ADD TO } 32 - 19 = 13$$

RANGE MUST BE 9.

CURRENT LOWEST IS 1

\therefore HIGHEST MUST BE 10 \rightarrow 10 and 3 (AI) [BOTH]

Karen has a spinner.

When the spinner is spun once, the probability that it will land on yellow is $\frac{2}{5}$
Karen spins the spinner 30 times.

Work out an estimate for the number of times the spinner lands on yellow.

$$\frac{2}{5} \times 30 \quad (m)$$

(11)
12

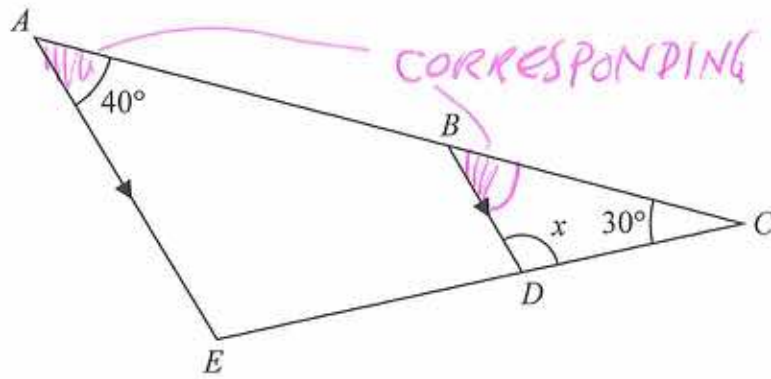


Diagram NOT
accurately drawn

ABC and EDC are straight lines.

AE is parallel to BD .

Angle $EAC = 40^\circ$

Angle $ACE = 30^\circ$

Work out the size of angle x .

Give reasons for your answer.

$\angle BDA = 40^\circ$ BECAUSE IT CORRESPONDS
TO ANGLE EAB (BI)

$$\begin{aligned} \therefore x &= 180 - (40 + 30) \text{ (ml)} \\ &= \underline{\underline{110^\circ}} \end{aligned}$$

(AI)

$x = \underline{\underline{110^\circ}}$

B is the point with coordinates $(1, 4)$

C is the point with coordinates $(6, 9)$

Find the coordinates of the midpoint of BC .

$$\left(\frac{1+6}{2}, \frac{4+9}{2} \right) \text{ (mid)}$$

$$\text{(A1) [BOTH]} \\ (3.5, 6.5)$$

A clothes shop has a sale.

In the sale, normal prices are reduced by 12%

The normal price of a shirt is £30

(a) Work out the sale price of the shirt.

$$\begin{array}{r} 30 \times 0.88 \\ \hline \end{array}$$

(M1)

(B1)

REMEMBER
THE ZERO

$$\begin{array}{r} \text{£ } 26.40 \\ \hline \end{array}$$

(3)

(A1)

The price of a coat is reduced by £9 in the sale.

(b) Work out the normal price of the coat.

$$0.12 \times \text{NORMAL} = 9$$

$$\text{NORMAL} = \frac{9}{0.12}$$

(M1)

(B1)

$$\begin{array}{r} \text{£ } 75 \\ \hline \end{array}$$

(3)

(A1)

A box contains toy cars.
Each car is red or blue or black or silver.

Emily takes at random a car from the box.
The table shows the probabilities that Emily takes a red car or a blue car or a black car.

Colour of car	Probability
red	0.20
blue	0.05
black	0.15
silver	

(a) Work out the probability that Emily takes a silver car.

$$1 - (0.20 + 0.05 + 0.15) \quad (m)$$

$$\begin{array}{r} 0.6 \\ \hline (2) \end{array} \quad (A)$$

Emily puts the car back into the box.
There are 6 blue cars in the box.

(b) Work out the total number of cars in the box.

$$\frac{6}{\text{TOTAL}} = 0.05$$

$$\Rightarrow \text{TOTAL} = \frac{6}{0.05} \quad (m)$$

$$\begin{array}{r} 120 \\ \hline (2) \end{array} \quad (A)$$

(a) Expand $x(x+2)$

$$\frac{x^2 + 2x}{(1)}$$

(b) Solve the inequality $4x - 7 > 3$

$$4x > 10 \quad (m1)$$

$$x > \frac{10}{4}$$

$$\frac{x > 2.5}{(2)}$$

(c) Solve $\frac{3-5m}{4} = 8$

Show clear algebraic working.

$$3 - 5m = 32 \quad (m1) \text{ [NO FRACTION]}$$

$$-5m = 29 \quad (m1) \text{ [M-TERM ISOLATED]}$$

$$m = \frac{29}{-5}$$

$$\frac{m = -5.8}{(3)}$$

The lengths of the sides of a triangle are in the ratios 2 : 6 : 7
The length of the longest side of the triangle is 24.5 cm.

7
LONGEST

Work out the perimeter of the triangle.

$$\frac{24.5}{7} = 3.5 \text{ (EACH PART)}$$

$$\therefore \text{TOTAL} = 3.5 \times 15$$

$$\underline{52.5} \text{ cm}$$

Solve the simultaneous equations

EXACTLY THE SAME

$$\begin{array}{r} 5x + y = 17 \quad \text{---} \textcircled{1} \\ x + y = 3 \quad \text{---} \textcircled{2} \end{array} \left. \vphantom{\begin{array}{r} 5x + y = 17 \\ x + y = 3 \end{array}} \right\} \text{SUBTRACT}$$

Show clear algebraic working.

$$\begin{array}{r} 4x = 14 \quad \textcircled{M1} \\ x = \frac{14}{4} \\ = \underline{\underline{3.5}} \quad \textcircled{A1} \end{array}$$

SUBSTITUTE INTO ①

$$\begin{aligned} 5(3.5) + y &= 17 \\ y &= 17 - 5(3.5) \\ &= \underline{\underline{-0.5}} \quad \textcircled{A1} \end{aligned}$$

$$x = \underline{\underline{3.5}}$$

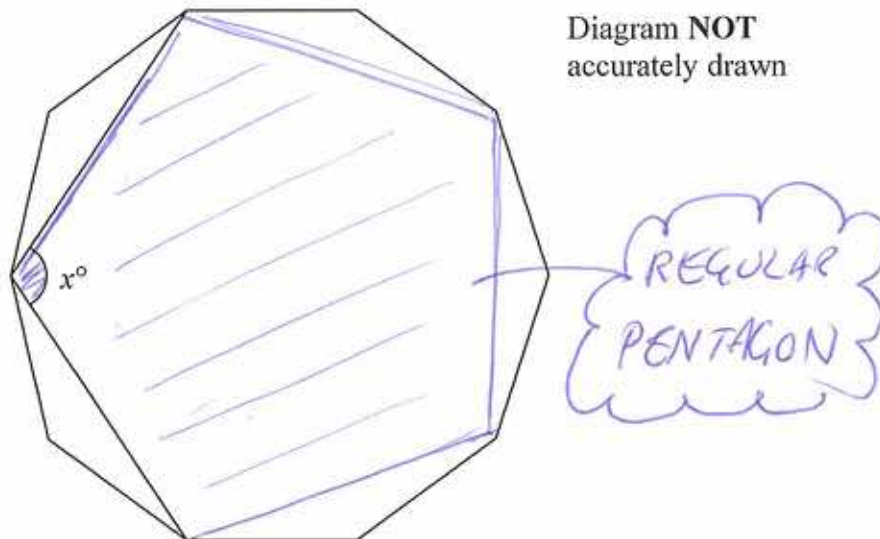
$$y = \underline{\underline{-0.5}}$$

Find an equation of the line that is parallel to the line $y = 4 - 2x$ and passes through the point $(3, 7)$

$$\text{GRADIENT} = -2. \quad (\text{B1})$$

$$\begin{aligned} \therefore y - 7 &= -2(x - 3) \\ \Rightarrow y &= -2(x - 3) + 7 \\ y &= -2x + 6 + 7 \\ y &= \underline{\underline{-2x + 13}} \quad (\text{A1}) \end{aligned} \quad \left. \vphantom{\begin{aligned} \Rightarrow y &= -2(x - 3) + 7 \\ y &= -2x + 6 + 7 \\ y &= \underline{\underline{-2x + 13}} \end{aligned}} \right\} (\text{M0}) \text{ [ANY]}$$

Here is a regular 10-sided polygon.



Work out the value of x .
Show your working clearly.

x IS THE INTERIOR ANGLE OF A
REGULAR PENTAGON. (m1)

$$\begin{aligned} \text{SUM} &= (n-2) \times 180 && \text{(m1)} \\ &= 3 \times 180 \\ &= 540 \end{aligned}$$

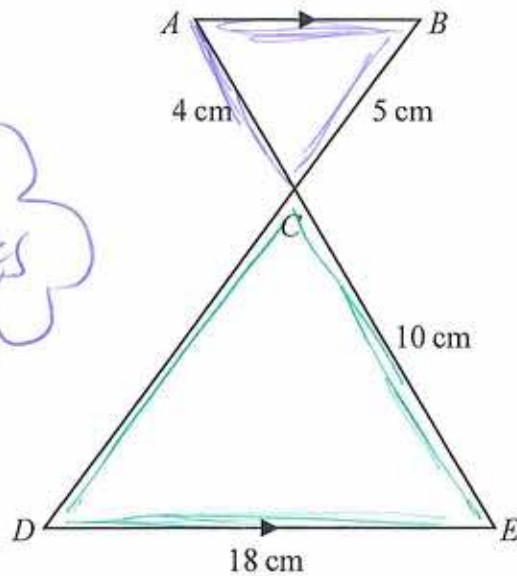
$$\begin{aligned} \therefore \text{EACH ANGLE} &= \frac{540}{5} && \text{(m1)} \\ &= \underline{\underline{108^\circ}} && \text{(A1)} \end{aligned}$$

ALTERNATIVE
METHODS ARE
FINE

$x = \dots\dots\dots$

Diagram NOT accurately drawn

SIMILAR TRIANGLES



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

SCALE FACTOR = $\frac{10}{4}$

= 2.5

(a) Calculate the length of CD.

5×2.5

(m)

12.5 (A)

(2) cm

(b) Calculate the length of AB.

$\frac{18}{2.5}$ (m)

7.2 (A)

(2) cm

The area of triangle ABC = $T \text{ cm}^2$

(c) Find the area of triangle CDE in terms of T.

$T \times 2.5^2$

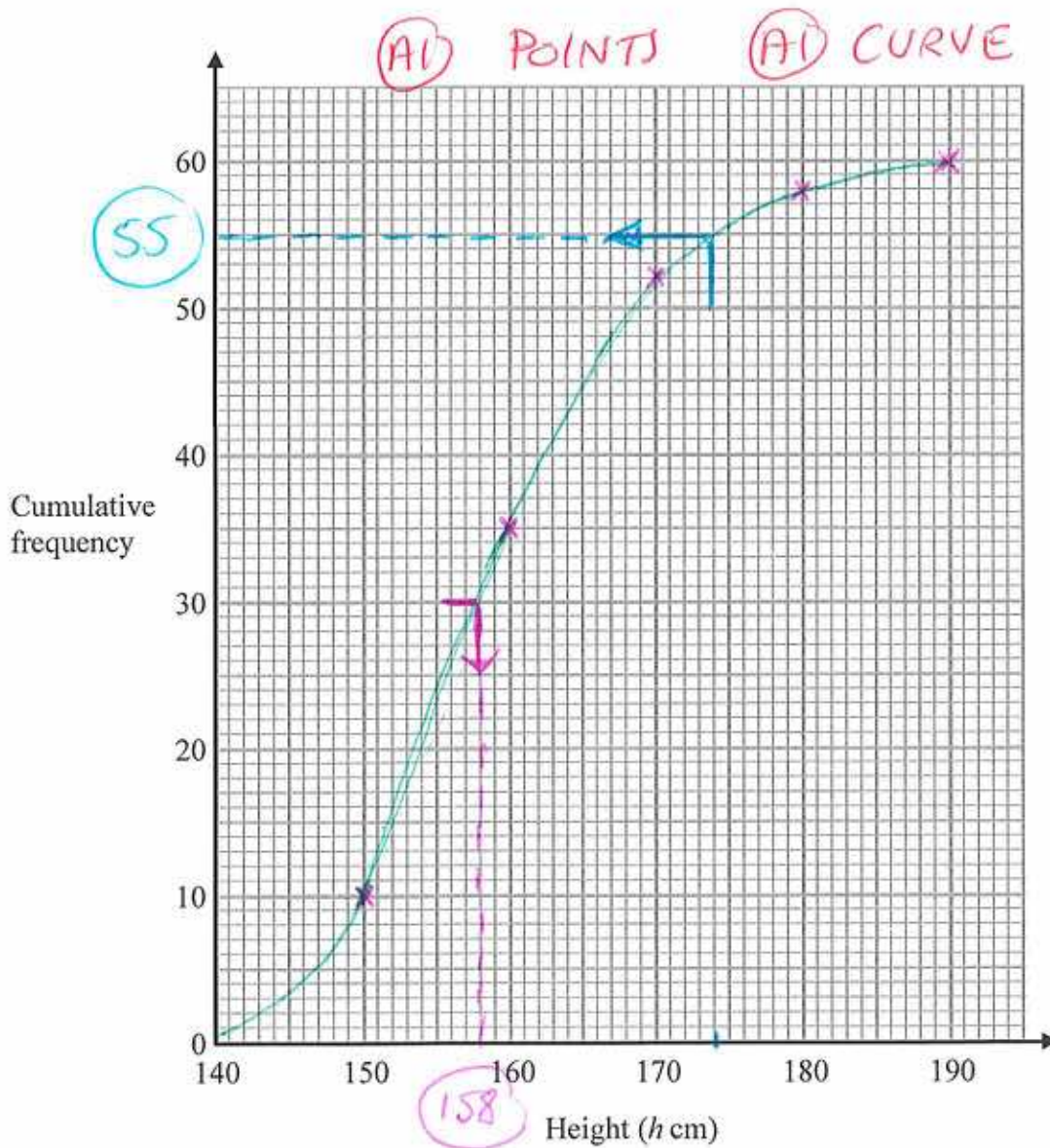
6.25 T (B)

(1) cm^2

The cumulative frequency table shows information about the heights of 60 men.

Height (h cm)	Cumulative frequency
$140 < h \leq 150$	10
$140 < h \leq 160$	35
$140 < h \leq 170$	52
$140 < h \leq 180$	58
$140 < h \leq 190$	60

(a) On the grid, draw a cumulative frequency graph for the table.



(2)

(b) Use your graph to find an estimate for the median height of the 60 men.

$$\frac{60}{2} = \text{30TH VALUE}$$

(m)

[157-159]

$$\frac{158}{(2)} \text{ cm}$$

(A)

(c) Use your graph to find an estimate for the number of the men who are taller than 174 cm.

$$60 - 55$$

(m)

$$\frac{5}{(2)}$$

(A)

The curve C has equation $y = 3x^2 - 12x + 8$

(a) Find $\frac{dy}{dx}$

$$6x - 12$$

$$\frac{dy}{dx} = \frac{6x - 12}{(2)}$$

(b) Find the coordinates of the point on C where the gradient of the curve is 18

$$6x - 12 = 18 \quad (M1)$$

$$6x = 30$$

$$x = \underline{5} \quad (A1)$$

$$\frac{dy}{dx} = 18$$

$$\begin{aligned} \therefore y &= 3(5)^2 - 12(5) + 8 \\ &= \underline{23} \quad (A1) \end{aligned}$$

$$\left(\underline{5}, \underline{23} \right) \quad (3)$$

(a) Simplify $\left(\frac{8e^6}{f^{12}}\right)^{\frac{1}{3}}$

$$\frac{8^{\frac{1}{3}} \times e^{6 \times \frac{1}{3}}}{f^{12 \times \frac{1}{3}}}$$

(B2)

$$\frac{2e^2}{f^4}$$

(2)

(b) Factorise fully $2y^2 - 72$

$$2(y^2 - 36) \quad (\text{ml})$$

$$2 \times (y - 6)(y + 6)$$

(A1)

$$2(y - 6)(y + 6)$$

(2)

(c) Simplify $\frac{2p^2 - p - 15}{p^2 - 3p}$

$$= \frac{(2p+5)(p-3)}{p(p-3)} \quad (\text{B1}) \text{ [FACTORISING]}$$

$$(\text{B1}) \text{ [FACTORISING]}$$

$$= \frac{2p+5}{p}$$

(A1)

$$\frac{2p+5}{p}$$

(3)

y is directly proportional to \sqrt{x}

When $x = 49$, $y = 4$

(a) Find a formula for y in terms of x .

$$y = k \times \sqrt{x} \quad (\text{M1})$$

$$\Rightarrow 4 = k \times \sqrt{49}$$

$$\Rightarrow k = \frac{4}{\sqrt{49}}$$

$$= \frac{4}{7}$$

(M1) [EITHER]

$$y = \frac{4}{7} \sqrt{x} \quad (\text{A1})$$

(3)

(b) Calculate the value of x when $y = 12$

$$y = \frac{4}{7} \sqrt{x}$$

$$12 = \frac{4}{7} \sqrt{x} \quad (\text{M1})$$

$$\sqrt{x} = 12 \times \frac{7}{4}$$

$$\sqrt{x} = 21$$

$$x = 21^2$$

$$x = 441 \quad (\text{A1})$$

(2)

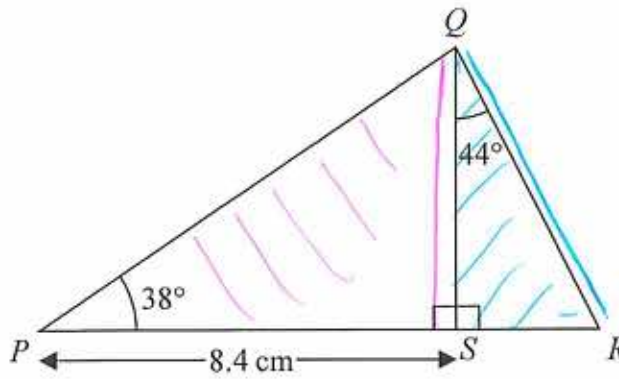


Diagram NOT accurately drawn

PSR is a straight line.

Angle PSQ = 90°

PS = 8.4 cm

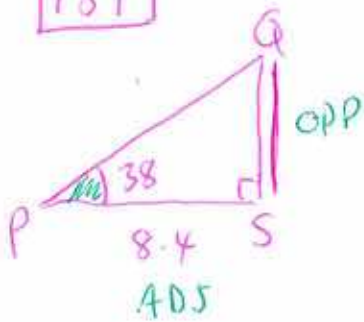
Angle QPS = 38°

Angle SQR = 44°

Work out the length of QR.

Give your answer correct to 3 significant figures.

1ST



SOH CAH TOA

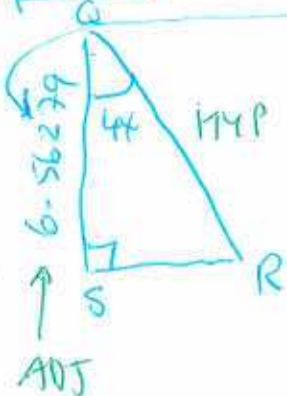
$$\tan 38 = \frac{\text{OPP}}{\text{ADJ}}$$

ADJ

$$\tan 38 = \frac{\text{OPP}}{8.4} \quad (m)$$

$$\begin{aligned} \text{OPP} &= 8.4 \tan 38 \\ &= 6.56279 \end{aligned} \quad (m)$$

2ND



SOH CAH TOA

$$\cos 44 = \frac{\text{ADJ}}{\text{HYP}}$$

$$\cos 44 = \frac{6.56279}{\text{QR}} \quad (m)$$

$$\begin{aligned} \text{QR} &= \frac{6.56279}{\cos 44} \\ &= 9.12336... \end{aligned}$$

$$9.12 \quad (A1) \text{ cm}$$

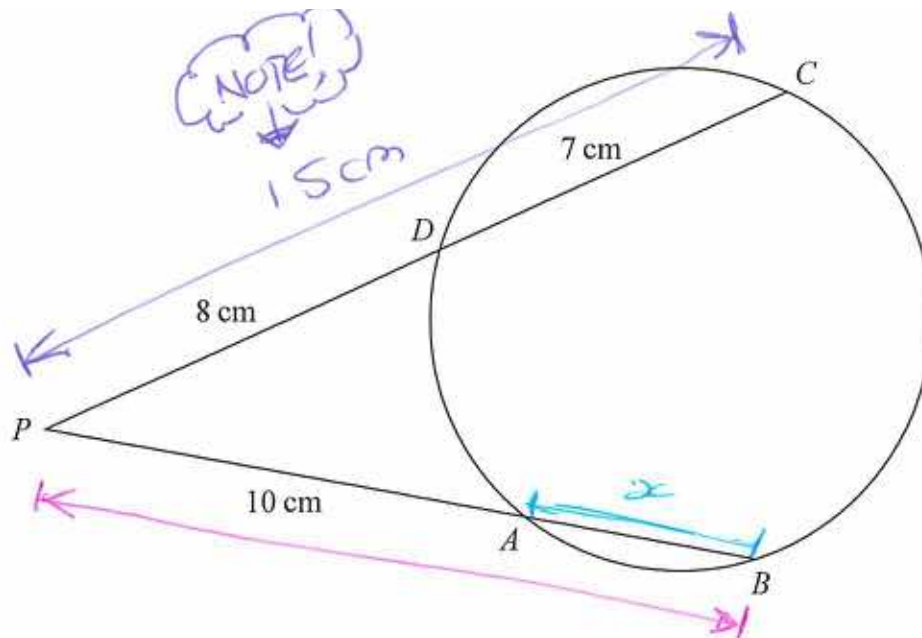


Diagram **NOT** accurately drawn

A , B , C and D are points on a circle.

PAB and PDC are straight lines.

$PA = 10$ cm, $PD = 8$ cm and $DC = 7$ cm.

Calculate the length of AB .

1ST

$$AP \times BP = DP \times CP$$

$$10 \times BP = 8 \times \underline{15} \quad (m)$$

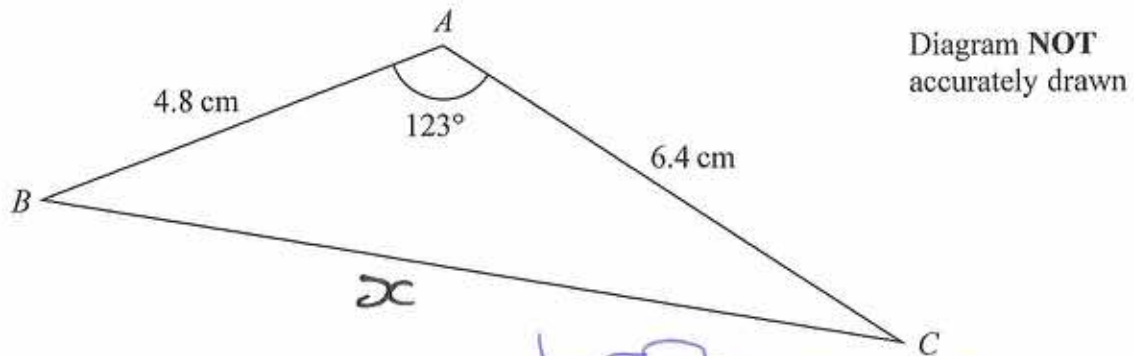
$$BP = \frac{8 \times 15}{10}$$

$$= 12 \quad (m)$$

$$\therefore AB = 12 - 10$$

$$= \underline{\underline{2 \text{ cm}}} \quad (A)$$

GET THIS RIGHT!!



Calculate the length of BC .

Give your answer correct to 3 significant figures.

USE

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$x^2 = 4.8^2 + 6.4^2 - 2 \times 4.8 \times 6.4 \cos 123$$

$$= 97.46 \dots \text{ (M1)}$$

$$x = \sqrt{97.46 \dots}$$

$$= 9.8723 \dots$$

$$= \underline{\underline{9.87 \text{ cm}}} \text{ (A1)}$$

Solve the equation $\frac{6}{x-2} - \frac{6}{x+1} = 1$

Show clear algebraic working.

$$\frac{6(x+1) - 6(x-2)}{(x-2)(x+1)} = 1 \quad \text{(M1) [SINGLE DENOM.]}$$

$$\Rightarrow \frac{6x+6 - 6x+12}{(x-2)(x+1)} = 1$$

$$\Rightarrow \frac{18}{(x-2)(x+1)} = 1$$

$$\Rightarrow 18 = (x-2)(x+1) \quad \text{(M1) [NO DENOMINATOR]}$$

$$18 = x^2 + x - 2x - 2$$

$$18 = x^2 - x - 2$$

$$\Rightarrow x^2 - x - 20 = 0 \quad \text{(M1) [QUADRATIC]}$$

$$(x+4)(x-5) = 0 \quad \text{(M1) [FACTORS OR FORMULA USE]}$$

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

$$x = \underline{\underline{5}} \quad \text{(A1) [BOTH]}$$

The diagram shows a solid cylinder.

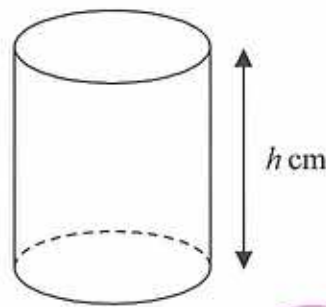


Diagram NOT accurately drawn

The cylinder has radius $4\sqrt{3}$ cm and height h cm.

The total surface area of the cylinder is $56\pi\sqrt{6}$ cm².

$$2\pi rh + 2\pi r^2$$

Find the exact value of h .

Give your answer in the form $a\sqrt{2} + b\sqrt{3}$, where a and b are integers.

Show your working clearly.

$$2\pi rh + 2\pi r^2 = 56\pi\sqrt{6} \quad \text{(M1) [EQUATION]}$$

$$2rh + 2r^2 = 56\sqrt{6} \quad \text{(M1)}$$

$$2 \times (4\sqrt{3})h + 2(4\sqrt{3})^2 = 56\sqrt{6}$$

$$8\sqrt{3}h + 2(16 \times 3) = 56\sqrt{6} \quad \text{(M1)}$$

$$8\sqrt{3}h + 96 = 56\sqrt{6}$$

$$8\sqrt{3}h = 56\sqrt{6} - 96$$

$$h = \frac{56\sqrt{6} - 96}{8\sqrt{3}} \quad \text{(M1)}$$

$$= \underline{\underline{7\sqrt{2} - 4\sqrt{3}}} \quad \text{(A1)}$$

I USED A CALCULATOR

The diagram shows sector OAB of a circle, centre O

$$A = \frac{50}{360} \times \pi r^2$$



Diagram NOT
accurately drawn

Angle AOB = 50°
Sector OAB has area $20\pi \text{ cm}^2$

Calculate the perimeter of sector OAB.
Give your answer correct to 3 significant figures.

$$A = \frac{50}{360} \times \pi r^2$$

1st

$$\text{AREA} = 20\pi$$

$$\text{So } \frac{50}{360} \times \pi r^2 = 20\pi \quad (\text{ml})$$

$$\Rightarrow \frac{50}{360} \times r^2 = 20$$

$$\Rightarrow r^2 = 20 \times \frac{360}{50}$$

$$r = \sqrt{20 \times \frac{360}{50}}$$

$$= \underline{\underline{12 \text{ cm}}} \quad (\text{Al})$$

2nd

$$\text{PERIMETER} = \frac{50}{360} \times 2\pi r + 2r \quad (\text{ml})$$

$$= \frac{50}{360} \times 2\pi \times 12 + \frac{2 \times 12}{\text{Al}}$$

$$= 34.4719\dots$$

$$= \underline{\underline{34.5 \text{ cm}}} \quad (\text{Al})$$

$y = 16 \times 10^{8k}$ where k is an integer.

Find an expression, in terms of k , for $y^{\frac{5}{4}}$
Give your answer in standard form.

$$\begin{aligned}
 & (16 \times 10^{8k})^{\frac{5}{4}} \\
 &= 16^{\frac{5}{4}} \times 10^{8k \times \frac{5}{4}} \\
 &= (\sqrt[4]{16})^5 \times 10^{10k} \quad \text{(B1)} \\
 &= 2^5 \times 10^{10k} \\
 &= 32 \times 10^{10k} \\
 &= 3.2 \times 10^{10k+1} \quad \text{(A1)}
 \end{aligned}$$