Candidate evidence

Question 1

Response 1

1. A caravan was bought for £20,000.
It depreciated by 11% in the first year.
It then depreciated by a further 6% each year over the next two years.
Calculate the value of the caravan three years after it was bought. 3

New Value = 20,000 × 0.89
= £17800

New Value = 17800 × 0.94^3
= £14784.40

The new Value of the caravan is £14784.40

Response 2

1. A caravan was bought for £20,000.
It depreciated by 11% in the first year.
It then depreciated by a further 6% each year over the next two years.
Calculate the value of the caravan three years after it was bought. 3

89 ÷ 100 = 0.89.

20,000 × 0.89 = 17,800

17,800 × 0.83^2

89 − 6 = 83

0.83

= £12,262.42

Response 3

1. A caravan was bought for £20,000.
It depreciated by 11% in the first year.
It then depreciated by a further 6% each year over the next two years.
Calculate the value of the caravan three years after it was bought.

£20000 17% 3years
100% - 17% = 83% ÷ 100 = 0·83
£20000 × (0·83)³
= £11435·74

Question 2

Response 4

2. The mass of a helium atom is 6.64×10^{-24} grams.
A flask contains 300 grams of helium.
Calculate the number of helium atoms in this flask.
Give your answer in scientific notation, correct to 3 significant figures.

~~B26~~
$300 \div 6.64\times10^{-24}$

$= 4.518072289\times10^{-23}$

~~$= 4.518\times10^{-23}$~~ $= 4.518\times10^{-23}$

~~$= 4.518000000\times1$~~

Question 2

Response 5

2. The mass of a helium atom is 6.64×10^{-24} grams.
A flask contains 300 grams of helium.
Calculate the number of helium atoms in this flask.
Give your answer in scientific notation, correct to 3 significant figures.

$6.64\times10^{-24} \div 300$

$= 2.21\dot{3}...$

$= 2.21\times10^{-26}$

Response 6

2. The mass of a helium atom is 6.64×10^{-24} grams.
A flask contains 300 grams of helium.
Calculate the number of helium atoms in this flask.
Give your answer in scientific notation, correct to 3 significant figures.

$6.64\times10^{-24}\times300=$

1.992×10^{-21}

Response 7

2. The mass of a helium atom is 6.64×10^{-24} grams.
A flask contains 300 grams of helium.
Calculate the number of helium atoms in this flask.
Give your answer in scientific notation, correct to 3 significant figures.

$300 \times (6.64 \times 10^{-24})$

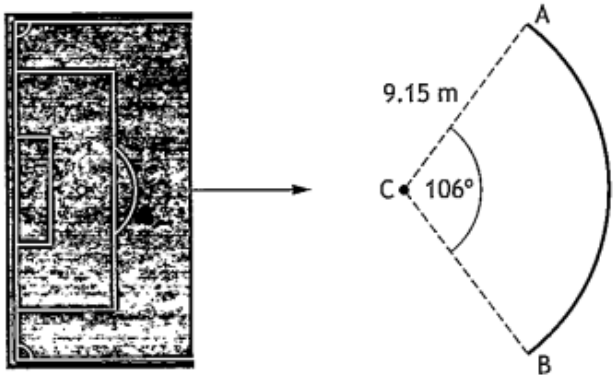
$= 1.992^{-21}$

$= 1.99^{-21}$

Question 3

Response 8

3. The diagram shows part of a football pitch.



The penalty spot is marked at point C.
AB is an arc of a circle, centre C, radius 9.15 metres.
Calculate the length of the arc AB.

$\frac{\theta}{360} \times$

$l = \frac{\theta}{360} \pi d$

$l = \frac{106}{360} \times \pi \times 18.30$

$= 8.403...$

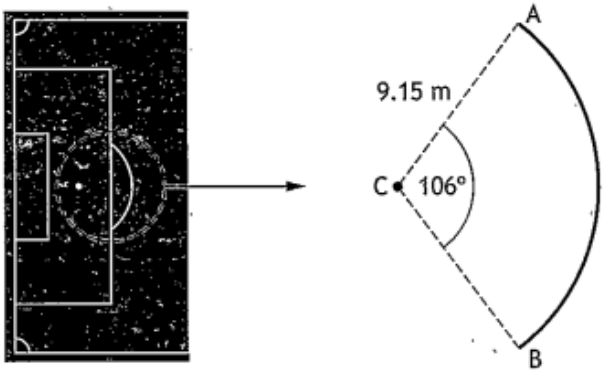
$AB = 8.46m$

$AB = 16.927...$

$AB = 16.93m$

Response 9

3. The diagram shows part of a football pitch.



The penalty spot is marked at point C.
AB is an arc of a circle, centre C, radius 9.15 metres.
Calculate the length of the arc AB.

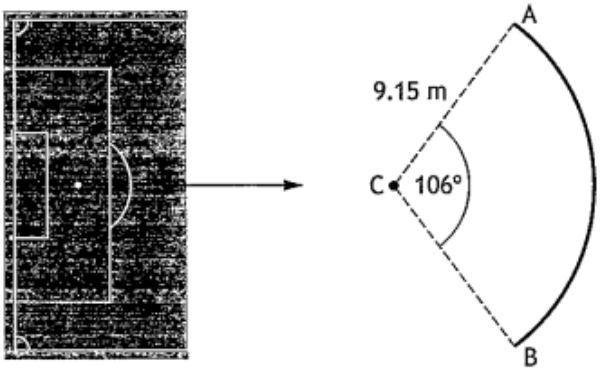
Arc length = $\frac{\text{Angle}}{360}$ π d

$= \frac{106}{360} \times 3.14 \times 18.3$

$= 16.99\text{m}$

Response 10

3. The diagram shows part of a football pitch.



The penalty spot is marked at point C.

AB is an arc of a circle, centre C, radius 9.15 metres.

Calculate the length of the arc AB.

~~$AL = \frac{\theta}{360} \times d$~~

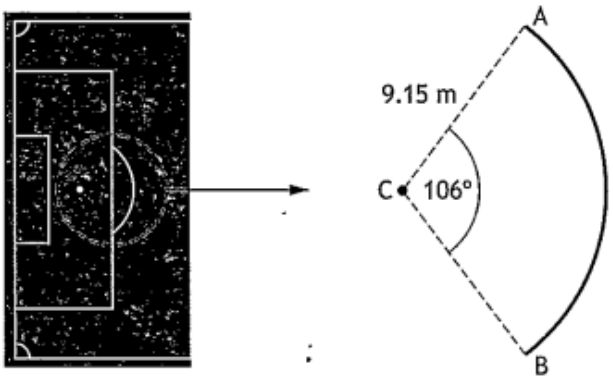
$AL = \frac{\theta}{360} \times \pi \times d$

$= \frac{106}{360} \times \pi \times 18.3$

$= 16.92 \text{ m}$

Response 11

3. The diagram shows part of a football pitch.



The penalty spot is marked at point C.
AB is an arc of a circle, centre C, radius 9.15 metres.
Calculate the length of the arc AB.

$$AL = \frac{\theta}{360} \pi r^2$$

$$AL = \frac{106}{360} \pi 9.15^2$$

$$AL = 77.445\ldots$$

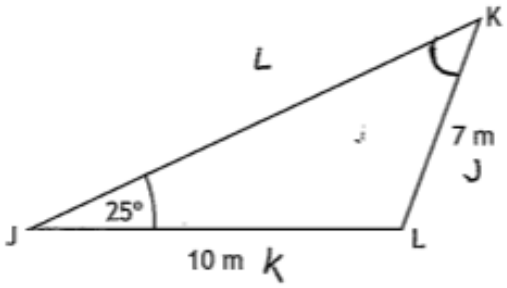
Arc length AB = 77.4m

Question 4

Response 12

4. The diagram shows triangle JKL.

- Angle KJL = 25°
- JL = 10 metres
- KL = 7 metres



Calculate the size of angle JKL.

$\frac{J}{\sin J} \quad \frac{K}{\sin K} \quad \frac{L}{\sin L}$

?

JKL = 40°

$\frac{7}{\sin 25} = \frac{10}{\sin k}$

$\frac{\sin K}{10} = \frac{\sin 27}{7}$

$\sin K = \frac{10 \times \sin 27}{7}$

$\sin k = 0.648557856 8$

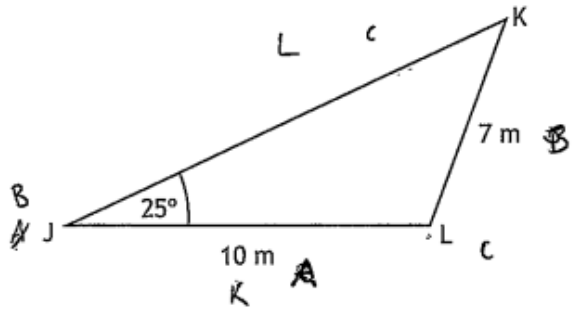
$K = \sin^{-1}(0.648557856 8)$

$K = 40.4329585°$

Response 13

4. The diagram shows triangle JKL.

- Angle KJL = 25°
- JL = 10 metres
- KL = 7 metres



Calculate the size of angle JKL.

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{7}{\sin 25} = \frac{10}{\sin B}$$

$$\frac{10}{\sin A} = \frac{7}{\sin 25}$$

$$\sin A = \frac{7}{\sin 25} \times 10$$

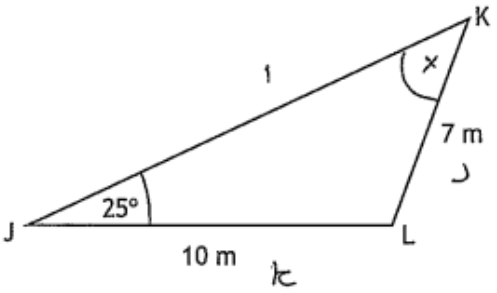
$$\sin^{-1}\left(\frac{70}{\sin 25}\right)$$

$$\sin A = \sin^{-1}(165.63)$$

Response 14

4. The diagram shows triangle JKL.

- Angle KJL = 25°
- JL = 10 metres
- KL = 7 metres



Calculate the size of angle JKL.

$\frac{a}{\sin A} = \frac{b}{\sin B}$

$\frac{10}{\sin K} = \frac{7}{\sin 25}$

$\sin K = \frac{7 \sin 25}{10}$

$K = \sin^{-1}\left(\frac{7 \sin 25}{10}\right)$

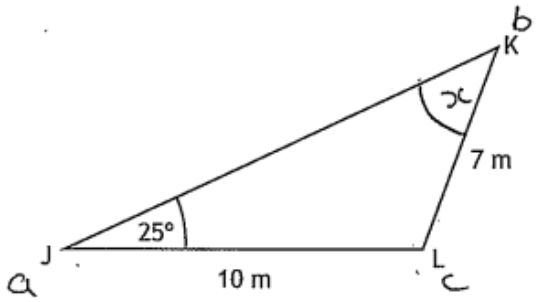
$K = 33.477..$

$K = 33.5°$

Response 15

4. The diagram shows triangle JKL.

- Angle KJL = 25°
- JL = 10 metres
- KL = 7 metres



Calculate the size of angle JKL.

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\frac{25^\circ}{\sin 7} = \frac{x}{\sin 10}$$

$$\sin 7\, x = 25 \sin(10)$$

$$\sin(7)\, x = 25 \sin(10)$$

$$x = \frac{25 \sin(10)}{\sin(7)}$$

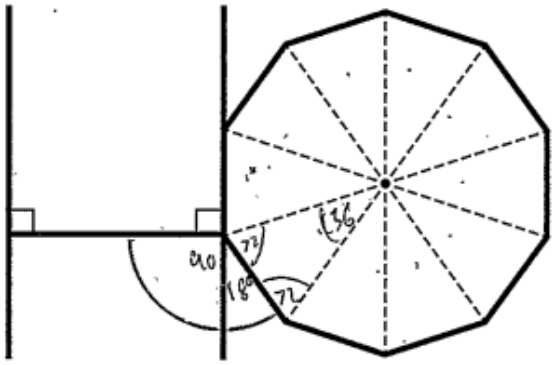
$$x = 35.621\ldots$$

$$x = 35.6$$

Question 5

Response 16

5. A logo consists of an H shape and a regular decagon.
The diagram represents the logo.



Calculate the size of the shaded angle.

360 ÷ 10 = 36°

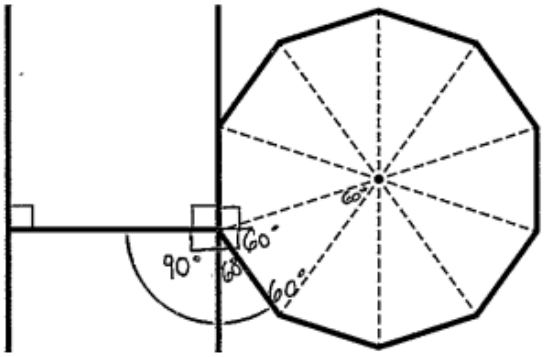
180 - 36 = 144 ÷ 2 = 72°

90 + 72 = 162°

90 + 18 = 108°

Response 17

5. A logo consists of an H shape and a regular decagon.
The diagram represents the logo.

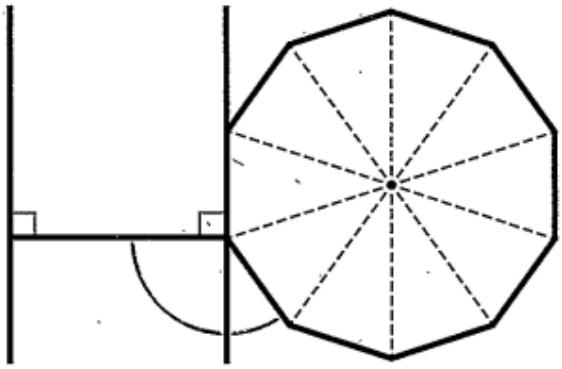


Calculate the size of the shaded angle.

Shaded angle = 150°

Response 18

5. A logo consists of an H shape and a regular decagon.
The diagram represents the logo.



Calculate the size of the shaded angle.

$360 \div 10 = 36 \div 3 = 12$

$36 + 36 = 72$

$72 + 90 = 162$

$180 - 90 = 90$

~~$12 + 12 = 24$~~

~~$24 + 90 = 114$~~

$360 - 36 + 36 + 90 + 90$

$360 - 252$

$= 108$

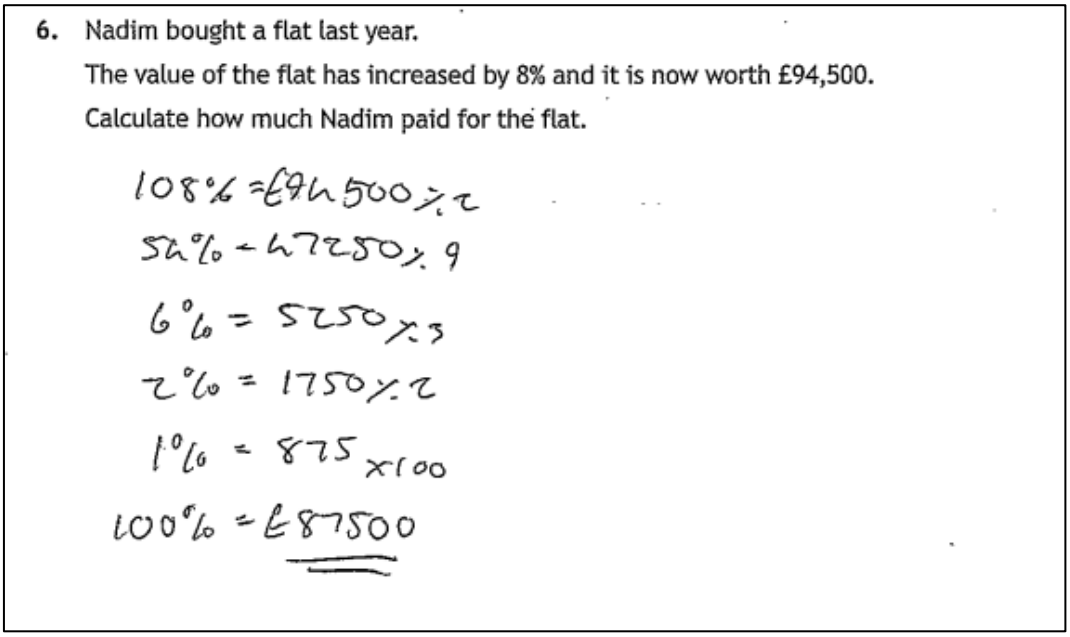
shaded angle $= 108 + 90 = 198$

~~$24 + 90 + 90 = 204$~~

~~$360 - 204 = 156$~~

Question 6

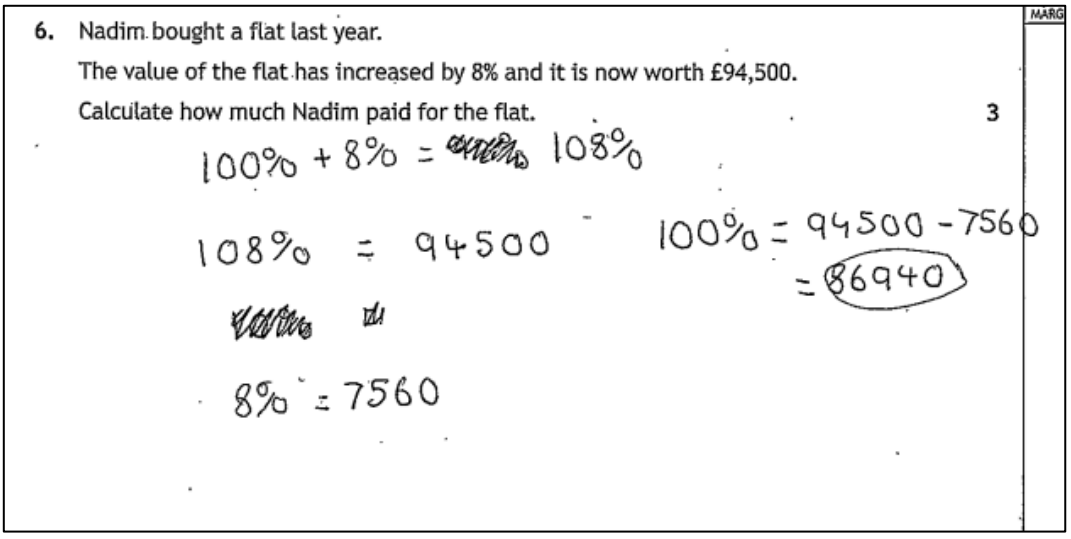
Response 19



6. Nadim bought a flat last year.
The value of the flat has increased by 8% and it is now worth £94,500.
Calculate how much Nadim paid for the flat.

108% = £94500 ÷ 12
54% = 47250 ÷ 9
6% = 5250 ÷ 3
2% = 1750 ÷ 2
1% = 875 x 100
100% = £87500

Response 20



6. Nadim bought a flat last year.
The value of the flat has increased by 8% and it is now worth £94,500.
Calculate how much Nadim paid for the flat. 3

MARG

100% + 8% = 108%

108% = 94500

8% = 7560

100% = 94500 - 7560
= 86940

Response 21

6. Nadim bought a flat last year.
The value of the flat has increased by 8% and it is now worth £94,500.
Calculate how much Nadim paid for the flat.

100% - 8% = 92%.

94,500 × 0.92 = £86,940

Response 22

6. Nadim bought a flat last year.
The value of the flat has increased by 8% and it is now worth £94,500.
Calculate how much Nadim paid for the flat.

94500 = 92%

1% = 1027.173...

100% = 102717.39

Question 7

Response 23

7. Change the subject of the formula $P=\frac{1}{3}mn-r$ to m.

$P=\frac{1}{3}mn-r$

$P+r=\frac{1}{3}mn$

$\frac{P+r}{n}=\frac{1}{3}m$

$3\frac{P+r}{n}=1m$

$m=3\frac{P+r}{n}$

Response 24

7. Change the subject of the formula $P=\frac{1}{3}mn-r$ to m.

$P=\frac{1}{3}mn-r$

$3p=mn-r$

$3p+r=mn$

$\frac{3p+r}{n}=m$

$m=\frac{3p+r}{n}$

Response 25

7. Change the subject of the formula $P=\frac{1}{3}mn-r$ to m.

$P = \frac{1}{3}mn - r$ to m

$\times 3 \quad \times 3$

$3P = mn - r$

$\div n \quad \div n$

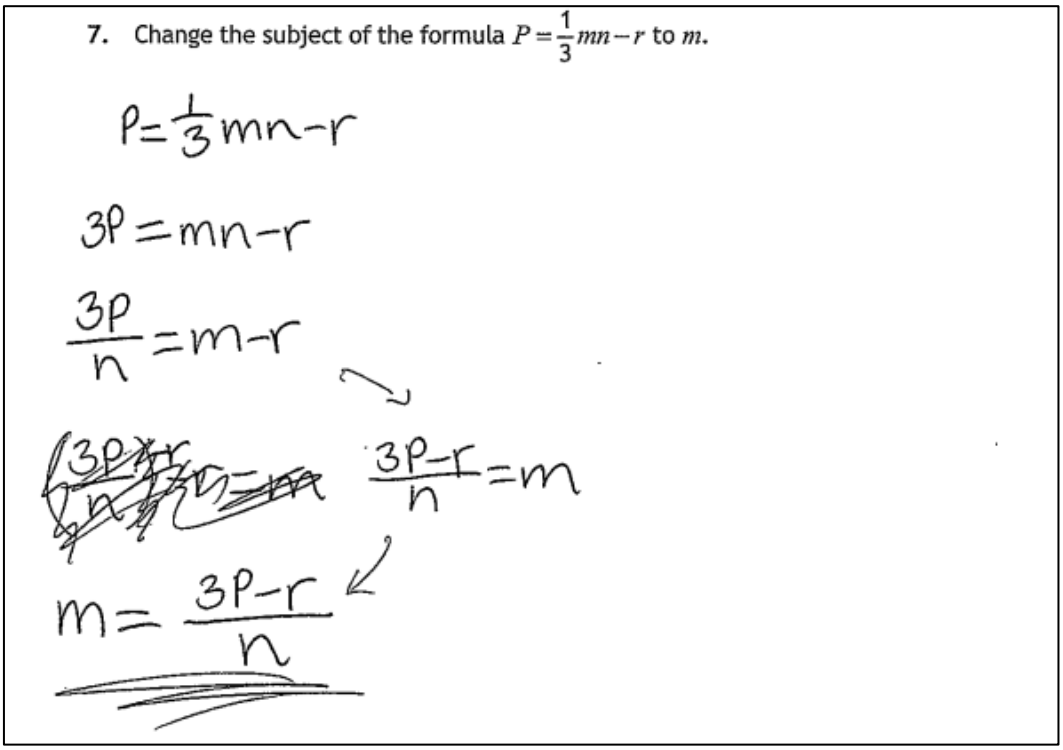
$\frac{3P}{n} = m - r$

$+r \quad +r$

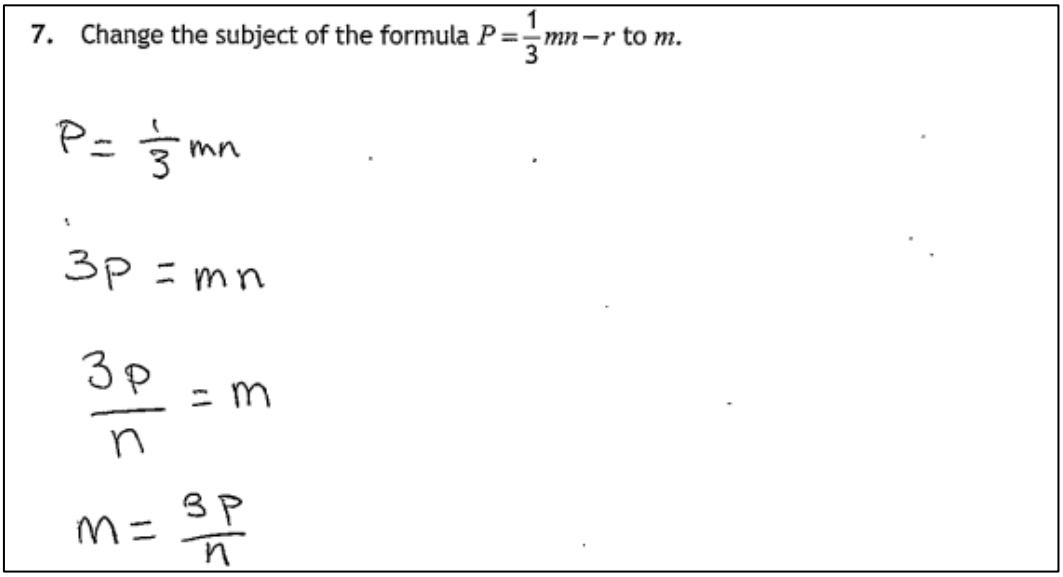
$\frac{3P+r}{n} = m$

$m = \frac{3P+r}{n}$

Response 26



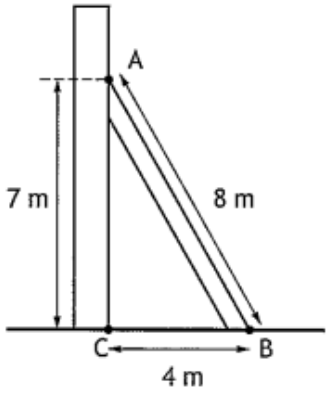
Response 27



Question 8

Response 28

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer.

Not perpendicular as 8.06 ≠ 8

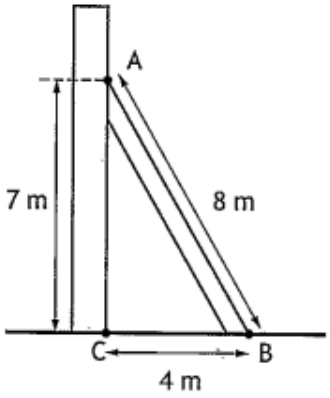
$7^2+4^2 \mid 8^2$

$\sqrt{65} \mid \sqrt{64}$

$8.06 \mid 8$

Response 29

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer.

$c^2 = a^2 + b^2$

$8^2 = 7^2 + 4^2$

$64 = 49 + 16$

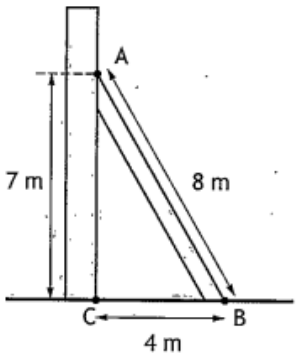
$64 = 65$

The wall is not perpendicular to the ground because

$64 \neq 65$

Response 30

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer.

[redacted]

If it is Perpendicular then:

$a^2 = b^2 + c^2$

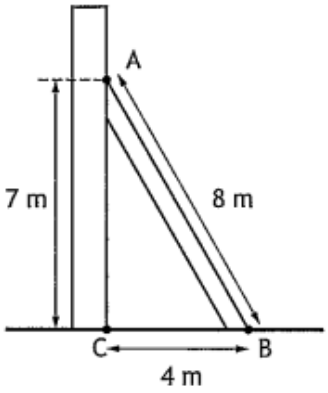
$8^2 = 7^2 + 4^2$

$64 = 49 + 16$

$64 \neq 65$ so wall is not Perpendicular

Response 31

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer.

$c^2 = a^2 + b^2$ By the

$c^2 = 4^2 + 7^2$

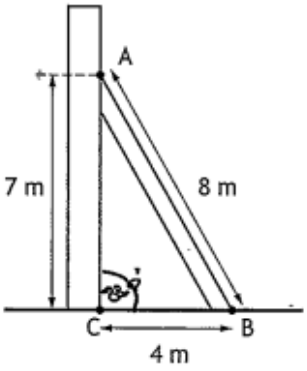
$= 65$

$= \sqrt{65}$

$= 8$ Proof

Response 32

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

Determine whether the wall is perpendicular to the ground.

Justify your answer. 4

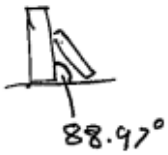
$$\cos C = \frac{a^2 + b^2 - c^2}{2bc}$$

$$\cos C = \frac{4^2 + 7^2 - 8^2}{2 \times 4 \times 7}$$

$$\cos C = 0.0178$$

$$C = \cos^{-1}(0.0178)$$

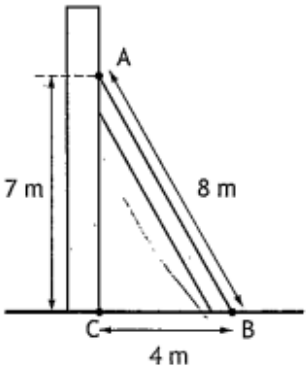
$$C = 88.97^\circ$$



Therefore the wall is not perpendicular to the ground.

Response 33

8. A wooden beam is used to support a wall built on horizontal ground as shown in the diagram.



The edge of the beam, AB, is 8 metres long.

C is at the foot of the wall.

A is 7 metres from C.

B is 4 metres from C.

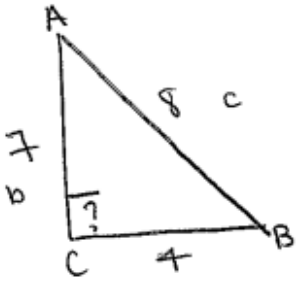
Determine whether the wall is perpendicular to the ground.

Justify your answer. 4

$8^2 = 7^2 + 4^2$

$64 = 49 + 16$

$64 \neq 65$



$\cos C = \frac{b^2 + c^2 - a^2}{2bc}$

$= \frac{7^2 + 8^2 - 4^2}{2 \times 7 \times 8}$

$= 0.866$

$C = 29.99\ldots$

$C = 30$

therefore it is not perpendicular to the wall as it is not at a 90° angle.

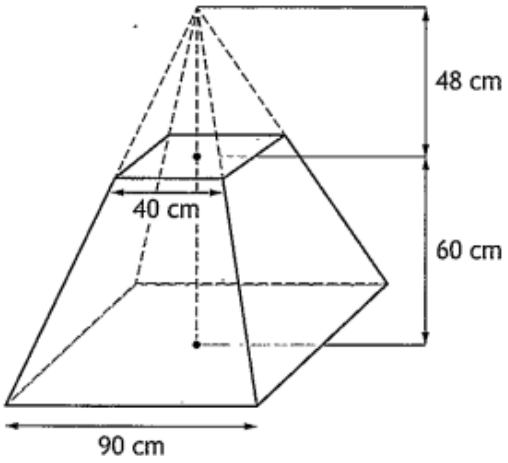
doesn't equal the shorter sides.

as the longest side

Question 9

Response 34

9. A concrete block is in the shape of a large pyramid with a small pyramid removed.



The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block.

PYRAMID = $V = \frac{1}{3}Ah$

SMALL

$V = \frac{1}{3}Ah$

$= \frac{1}{3} \times 40 \times 40 \times 48$

$V = 6400\ cm^3$

LARGE

$V = \frac{1}{3}Ah$

$= \frac{1}{3} \times 90 \times 90 \times 108$

$V = 32400\ cm^3$

$h = 60 + 48$

$= 108$

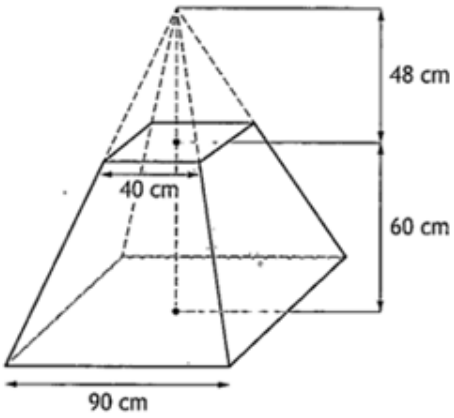
BLOCK VOL = $32400 - 6400$

$= 26000\ cm^3$

Question 9

Response 35

9. A concrete block is in the shape of a large pyramid with a small pyramid removed.



The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block. 4

small

$A = \frac{1}{2}bh$

$A = \frac{1}{2} \times 40 \times 48$

$A = 960$

$V = \frac{1}{3}Ah$

$V = \frac{1}{3} \times 960 \times 48$

$V = 15360\ cm^3$

big

$V = \frac{1}{3}Ah$

$V = \frac{1}{3} \times 2700 \times 60$

$V = 54000\ cm^3$

$A = \frac{1}{2}bh$

$A = \frac{1}{2} \times 90 \times 60$

$A = 2700$

Volume =

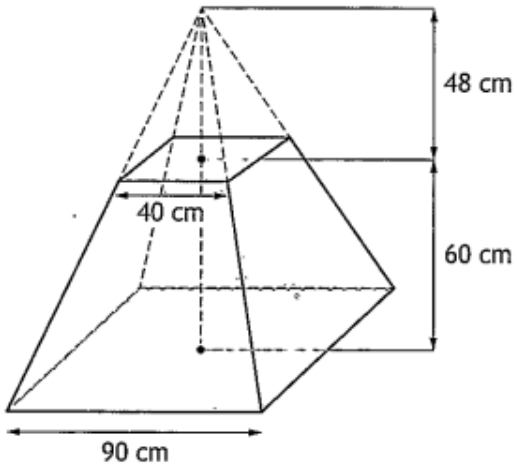
$54000 - 15360$

$= 38640\ cm^3$

[Turn over

Response 36

9. A concrete block is in the shape of a large pyramid with a small pyramid removed.



The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block.

$V1 = \frac{1}{3} LBH$

$V1 = \frac{1}{3} 40 \times 48$

$V = 640$

$V2 = \frac{1}{3} Lh$

$V2 = \frac{1}{3} 90 \times 60$

$V2 = 1800$

Total volume

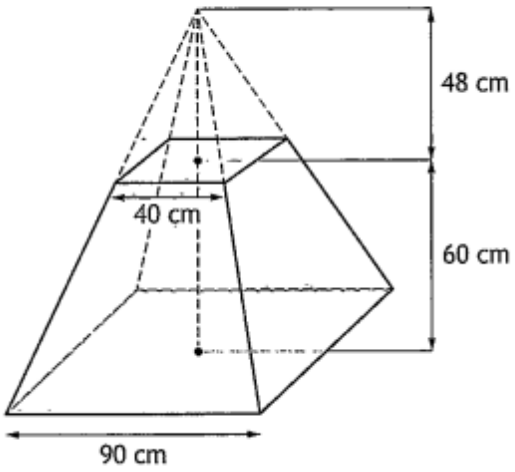
$V1 + V2$

$1800 + 640$

$= 2440 cm^3$

Response 37

9. A concrete block is in the shape of a large pyramid with a small pyramid removed.



The large pyramid has a square base of length 90 centimetres.

The small pyramid has a square base of length 40 centimetres and a height of 48 centimetres.

The block has height 60 centimetres.

Calculate the volume of the block.

$V = \frac{1}{3} Ah$

$V = \frac{1}{3} \times 360 \times 60$

$V = 7200$

$V = \frac{1}{3} Ah$

$V = \frac{1}{3} \times 160 \times 48$

$V = 2560$

$7200 + 2560$

Volume $= 9760$

Question 10

Response 38

10. Express

$$\frac{7}{x-3}-\frac{2}{x}, \quad x \neq 3, x \neq 0$$

as a single fraction in its simplest form.

$$\frac{7x}{x(x-3)} - \frac{2x-6}{x(x-3)} = \frac{5x-6}{x(x-3)}$$

Response 39

10. Express

$$\frac{7}{x-3}-\frac{2}{x}, \quad x \neq 3, x \neq 0$$

as a single fraction in its simplest form.

$$\frac{7}{x-3} - \frac{2}{x}$$

$$\frac{7(x)}{(x-3)(x)} - \frac{2(x-3)}{(x-3)(x)}$$

$$\frac{7x-2x+6}{(x-3)(x)} \qquad \frac{5x+6}{(x-3)(x)} \qquad \frac{5x-2}{x^2}$$

Response 40

10. Express

$$\frac{7}{x-3}-\frac{2}{x}, \quad x \neq 3, x \neq 0$$

as a single fraction in its simplest form.

$$\frac{7}{x-3}-\frac{2}{x} = \frac{7x}{x^2-3}-\frac{2x-6}{x^2-3} = \frac{5x-6}{x^2-3}$$

Response 41

10. Express

$$\frac{7}{x-3}-\frac{2}{x}, \quad x \neq 3, x \neq 0$$

as a single fraction in its simplest form.

$\frac{7}{x-3} - \frac{2}{x}$

$\frac{7x}{x-3} - \frac{2(x-3)}{x}$

$\frac{7x \; 2(x-3)}{(x-3)\; x}$

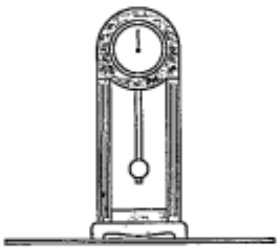
$\frac{14x^2 - 21x}{x^2-3}$

$\frac{35x^3}{x^2-3}$

Question 11

Response 42

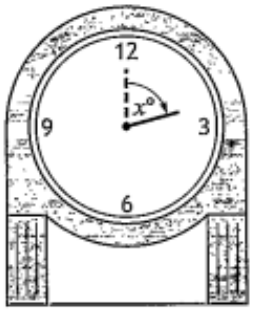
11. Anna has a grandfather clock in her house.



The height of the tip of the hour hand above the floor, in centimetres, is given by

$$h = 20\cos x° + 147$$

where $x°$ is the angle the **hour hand** has rotated through since 12 o'clock.



Calculate the first two values of x for which the tip of the hour hand is 150 centimetres above the floor.

$h = 20\cos x + 147$

$150 = 20\cos x + 147$

$20\cos x + 147 = 150$
$-147 \quad -147$

$\frac{20\cos x}{20} = \frac{3}{20}$

$\cos x° = 0.15$

$x = 81.37°, 98.63°$

S	A
$180 - 81.37$	RAA $= 81.37$
T	C

Response 43

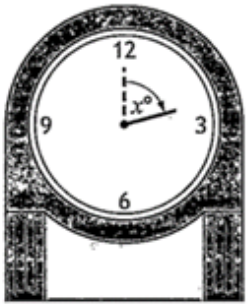
MARK

11. Anna has a grandfather clock in her house.

The height of the tip of the hour hand above the floor, in centimetres, is given by

$$h = 20\cos x° + 147$$

where $x°$ is the angle the **hour hand** has rotated through since 12 o'clock.



Calculate the first two values of x for which the tip of the hour hand is 150 centimetres above the floor. 4

$h = 20\cos x° + 147$

$150 = 20\cos x° + 147$

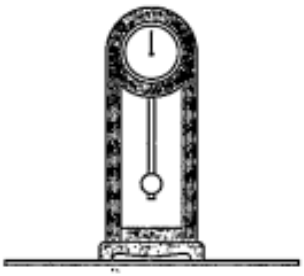
$\frac{150}{20\cos} = x° + 147$

$\frac{150-147}{20\cos} = x°$

$\frac{3}{20\cos} = x°$ $x° = \frac{3}{20\cos}$

Response 44

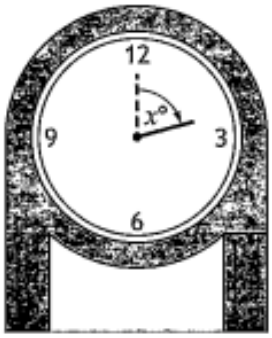
11. Anna has a grandfather clock in her house.



The height of the tip of the hour hand above the floor, in centimetres, is given by

$$h = 20\cos x° + 147$$

where $x°$ is the angle the **hour hand** has rotated through since 12 o'clock.



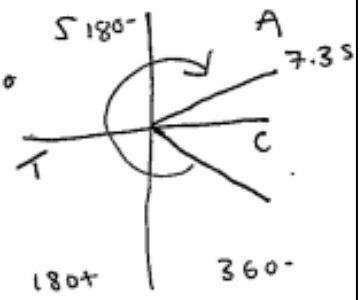
Calculate the first two values of x for which the tip of the hour hand is 150 centimetres above the floor.

$20\cos x° + 147$

$\frac{147}{20} = 7.35°$

$\cos^{-1}\left(\frac{147}{20}\right)$

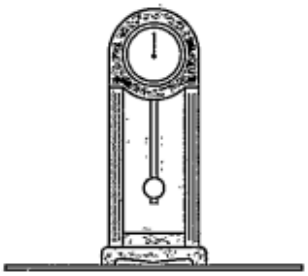
$\cos^{-1}(7.35$



$= 352.65°$

Response 45

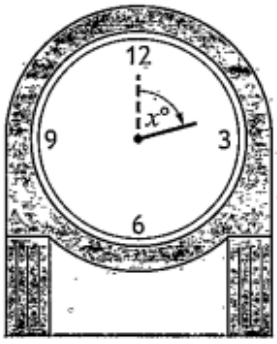
11. Anna has a grandfather clock in her house.



The height of the tip of the hour hand above the floor, in centimetres, is given by

$$h = 20\cos x° + 147$$

where $x°$ is the angle the **hour hand** has rotated through since 12 o'clock.



Calculate the first two values of x for which the tip of the hour hand is 150 centimetres above the floor.

Maureen

$h = 20\cos x + 147$

$h = 20\cos 150 + 147$

$= 129.7$

Question 12

Response 46

12. Simplify $\frac{x^2-16}{x^2+x-20}$.

$\frac{x^2-16}{x^2+x-20}$ $\frac{(x-4)(x+4)}{(x-4)(x+5)}$

$\frac{x+4}{x+5}$ $\frac{4}{5}$

Response 47

12. Simplify $\frac{x^2-16}{x^2+x-20}$.

$\frac{(x+4)(x-4)}{(x-4)(x-5)}$

$\frac{x+4}{x-5}$

Response 48

12. Simplify $\frac{x^2-16}{x^2+x-20}$.

$$\frac{(x+2)(x-8)}{(x-10)(x+2)}$$

$$\frac{(x-8)}{(x-10)}$$

Response 49

12. Simplify $\frac{x^2-16}{x^2+x-20}$.

$$= \frac{x^2-16}{x^2+x-20}$$

$$= \frac{-16}{x-20}$$

$$= \frac{-4}{x-5}$$

Question 13

Response 50

13. Simplify $2\sin^2 x° + 2\cos^2 x°$.
Show your working. 2

$2\sin^2 x + 2\cos^2 x$

$\sin^2 x + \cos^2 x = 1$

$(\sin^2 x + \cos^2 x) + (\sin^2 x + \cos^2 x)$

$1 + 1$

$= 2$

Response 51

13. Simplify $2\sin^2 x° + 2\cos^2 x°$.
Show your working.

$2\sin^2 x + 2\cos^2 x°$

$2\sin^2 x + 2\cos^2 x = 2 \div 2$

$\sin^2 x + \cos^2 x = 1$

Response 52

13. Simplify $2\sin^2 x° + 2\cos^2 x°$.
Show your working.

$2\sin^2 x + 2\cos^2 x \mid \sin^2 x + \cos^2 x = 1$

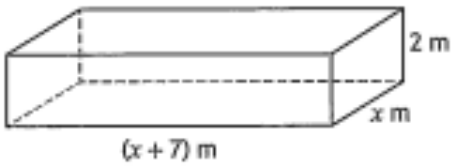
$= 2 + 2 + 1$

$= 5$

Question 14

Response 53

14. A storage unit, built in the shape of a cuboid, is shown.



It has length $(x+7)$ metres, breadth x metres and height 2 metres.
The volume of this unit is 45 cubic metres.

x^2+7x

$a=2 \quad b=14 \quad c=-45$

(a) Show that $2x^2+14x-45=0$.

$(x+7)^2 \times 2x$

$2x^2+14x-45=0$

$2x(x+7)=45$

(b) Calculate x, the breadth of the storage unit.
Give your answer correct to 1 decimal place.

$2x^2+14x-45 \quad a=2 \quad b=14 \quad c=-45$

$$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$$

$$x=\frac{-14\pm\sqrt{14^2-4\times2\times-45}}{4}$$

1st

$x=9.579652245$

$x=9.6\text{ m}$ to 1dp

$x=9.6\text{cm}$ ←

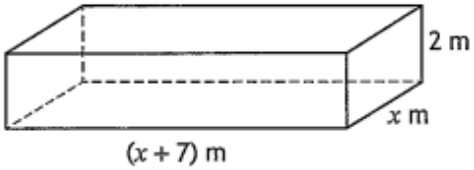
2nd

$x=-9.394913061$

$x=-9.4\text{cm}$

Response 54

14. A storage unit, built in the shape of a cuboid, is shown.



It has length $(x+7)$ metres, breadth x metres and height 2 metres.
The volume of this unit is 45 cubic metres.

(a) Show that $2x^2+14x-45=0$.

$2x^2+14x=45$

$2x^2=31x$

$(x+7)\times x\times 2=45$

$x^2+2x+7x+2x=45$

$2x^2+14x=45$

$2x^2+14x-45=0$

(b) Calculate x, the breadth of the storage unit.
Give your answer correct to 1 decimal place.

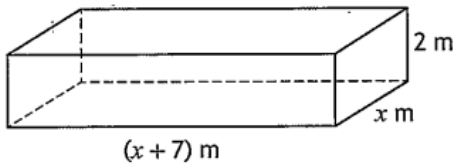
$(2.395+7)\times 2.395\times 2=45$

$x=2.395$

$=2.4$ m

Response 55

14. A storage unit, built in the shape of a cuboid, is shown.



It has length $(x+7)$ metres, breadth x metres and height 2 metres.

The volume of this unit is 45 cubic metres.

(a) Show that $2x^2+14x-45=0$.

$a=2$
$b=14$
$c=-45$

$x=\frac{-b\pm\sqrt{(b^2-4ac)}}{2a}$

$x=\frac{-14\pm\sqrt{(14^2-4(2)(45)}}{4}$

$x=\frac{-14+\sqrt{196-360}}{4}$

$x=\frac{-14+\sqrt{-164}}{4}$

$x=\frac{-14+\sqrt{164}}{4}$

$x=-0.298$

OR

$x=\frac{-14-\sqrt{164}}{4}=6.7$

$x=$

(b) Calculate x, the breadth of the storage unit.

Give your answer correct to 1 decimal place.

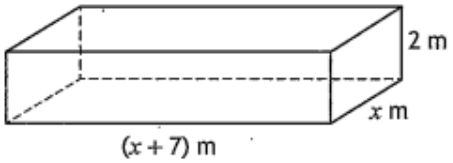
$x=L\times h\times b$

$x=(x+7)\times 2\times x$

$x=2$

Response 56

14. A storage unit, built in the shape of a cuboid, is shown.



It has length $(x+7)$ metres, breadth x metres and height 2 metres.

The volume of this unit is 45 cubic metres.

(a) Show that $2x^2+14x-45=0$.

$a=2 \quad b=14 \quad c=-45$

$2x^2+14x-45=0$

$x=\frac{-b\pm\sqrt{(b^2-4ac)}}{2a}$

$x=\frac{-14\pm\sqrt{14^2-4(2)(-45)}}{2(2)}$

$x=\frac{-14+\sqrt{556}}{4}$ and $x=\frac{-4-\sqrt{566}}{4}$

$x=2.394491306$ $x=-9.447688677$

$x=-9.45$

$x=2.39$

(b) Calculate x, the breadth of the storage unit.

Give your answer correct to 1 decimal place.

$V=h\times L\times B$

$45=2\times L\times(x+7)$

$\div 2$

$22.5=L\times(x+7)$

$\div(x+7)$

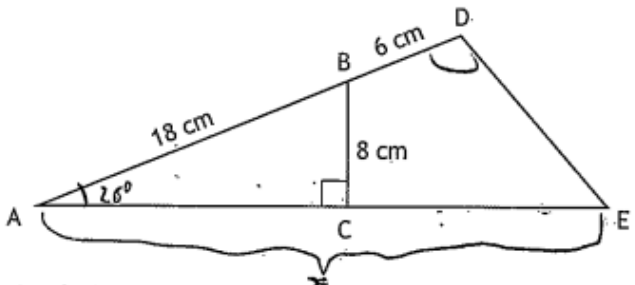
$\frac{22.5}{(x+7)}=L$

Question 15

Response 57

15. In the diagram:

- AC is perpendicular to BC
- AB = 18 centimetres
- BD = 6 centimetres
- BC = 8 centimetres.



The area of triangle ADE is 160 square centimetres.

Calculate the length of AE.

$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

$\frac{\sin A}{8} = \frac{\sin 90}{18}$ $\sin A = \frac{8 \sin 90}{18} = \frac{4}{9} = 0.444$

$A = \sin^{-1}\frac{4}{9}$

$= 26°$

$A = \frac{1}{2} ab \sin C$

$160 = \frac{1}{2} \times 24 \times x \times \sin 26$

$320 = 24 \times x \times \sin 26$

$\frac{320}{\sin 26} = 24x$

$730 = 24x$

$30.41 = x$

$AE = 30.41$ cm

Response 58

15. In the diagram:

- AC is perpendicular to BC
- AB = 18 centimetres
- BD = 6 centimetres
- BC = 8 centimetres.

$a^2 = c^2 - b^2$

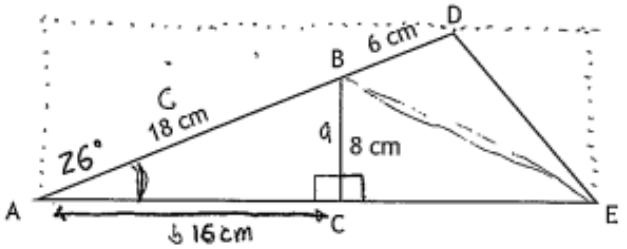
$a^2 = 18^2 - 8^2$

$a^2 = 324 - 64$

$a^2 = 260$

$a = \sqrt{260}$

$a = 16$



The area of triangle ADE is 160 square centimetres.

Calculate the length of AE.

$160 = \frac{1}{2}(24)\,b\,(\sin 26)$

$160 = 12 \times \sin 26 \times b$

$160 = 5.29 \times b$

$\div 5.29$

$30.24574669 = b$

$30 = b$

$AE = 30\text{ cm}$

$A = \frac{1}{2}ab\sin C$

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

$\cos A = \frac{16^2 + 18^2 - 8^2}{2(16)(18)}$

$\cos A = \frac{256 + 324 - 64}{576}$

$\cos A = 0.89583333$

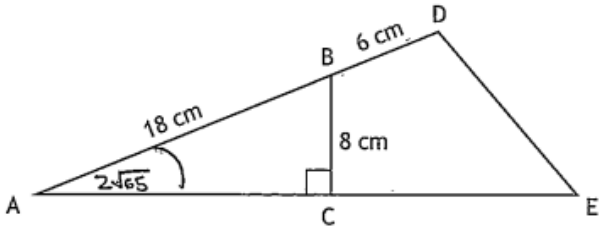
$A = \cos^{-1}(0.89583333)$

$A = 26°$

Response 59

15. In the diagram:

- AC is perpendicular to BC
- AB = 18 centimetres
- BD = 6 centimetres
- BC = 8 centimetres.



The **area** of triangle ADE is 160 square centimetres.

Calculate the length of AE.

$A = \frac{1}{2}ab\sin C$

$160 = \frac{1}{2} \times 24 \times b \times \sin(2\sqrt{65})$

$\frac{320}{24 \cdot \sin(2\sqrt{65})} = b$

$b = 48.022\text{ cm}$

$c^2 = a^2 - b^2$

$c^2 = 18^2 - 8^2$

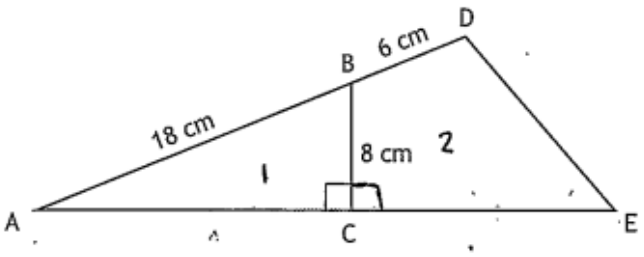
$c^2 = 260$

$c = 2\sqrt{65}$ or 16.12 (rounded)

Response 60

15. In the diagram:

- AC is perpendicular to BC
- AB = 18 centimetres
- BD = 6 centimetres
- BC = 8 centimetres.



The area of triangle ADE is 160 square centimetres.
Calculate the length of AE.

~~A1 = $\frac{1}{2}$ ab sinC~~

~~A1 = $\frac{1}{2}$ (18)(6) sin 90~~

~~A1 = 54~~

~~Total Area~~

~~A2 = $\frac{1}{2}$ ab sinC~~

~~A2 = $\frac{1}{2}$ (6)(8) sin 90~~

~~A2 = 24~~

$18^2 - 8^2 = 260$

$\sqrt{260} = 16.12$

$8^2 - 6^2 = 28$

$\sqrt{28} = 5.291$

16.1 + 5.2

Length AE = 21.4 cm