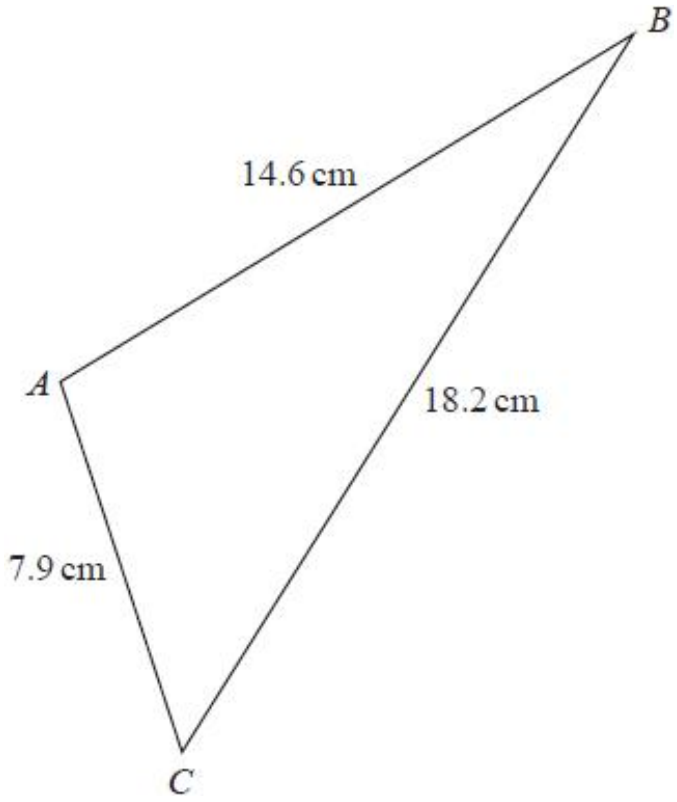
Trigonometry Exam Questions

Q1. Here is triangle ABC.

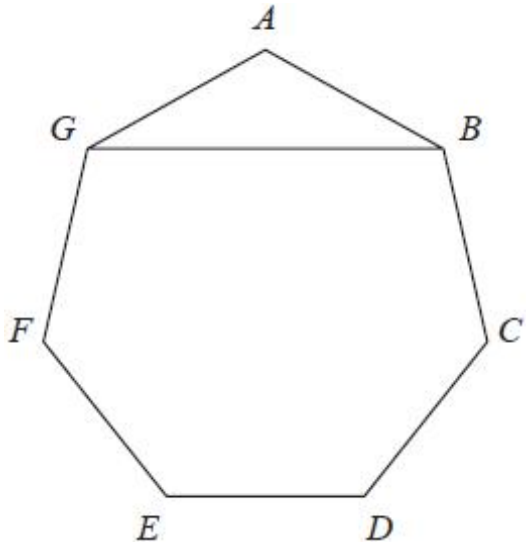
Work out the area of triangle ABC.
Give your answer correct to 3 significant figures.



…… cm^2

(Total 4 marks)

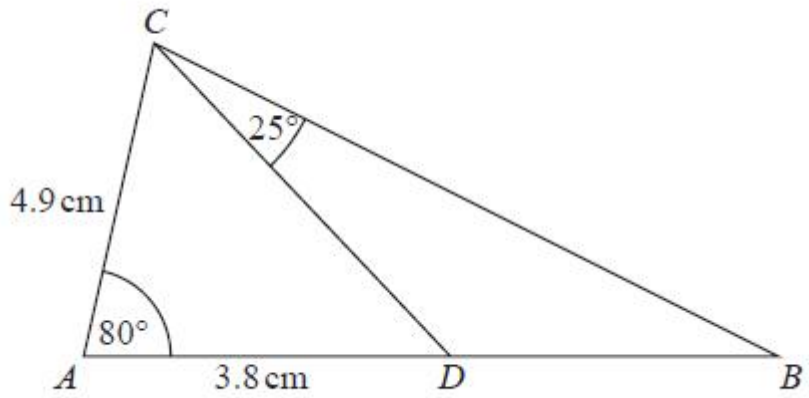
Q2. $ABCDEFG$ is a regular heptagon.



The area of triangle ABG is 30 cm^2
Calculate the length of GB.
Give your answer correct to 3 significant figures.
You must show all your working.

…… cm
(Total 5 marks)

Q3. ABC is a triangle.



D is a point on AB.
Work out the area of triangle BCD.
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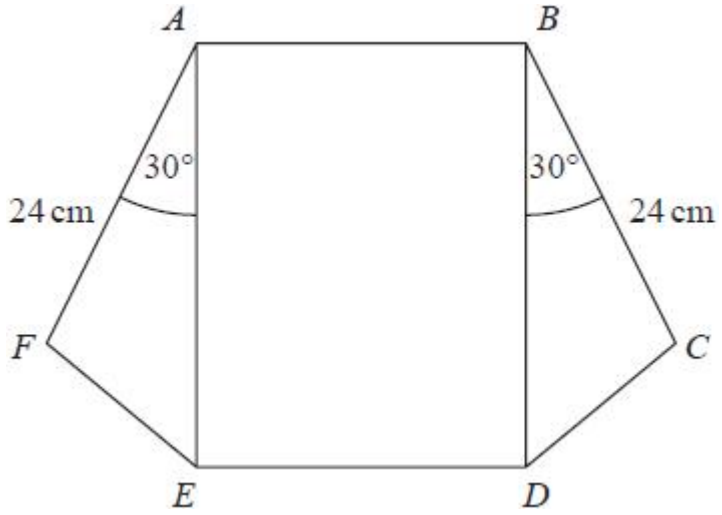
Q4. The diagram shows a rectangle, $ABDE$, and two congruent triangles, AFE and BCD.



area of rectangle $ABDE$ = area of triangle AFE + area of triangle BCD

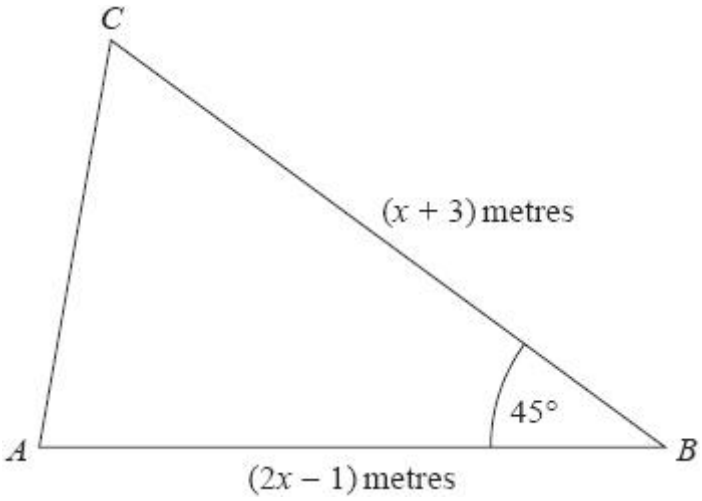
$AB : AE = 1 : 3$

Work out the length of AE.

…… cm

(Total 4 marks)

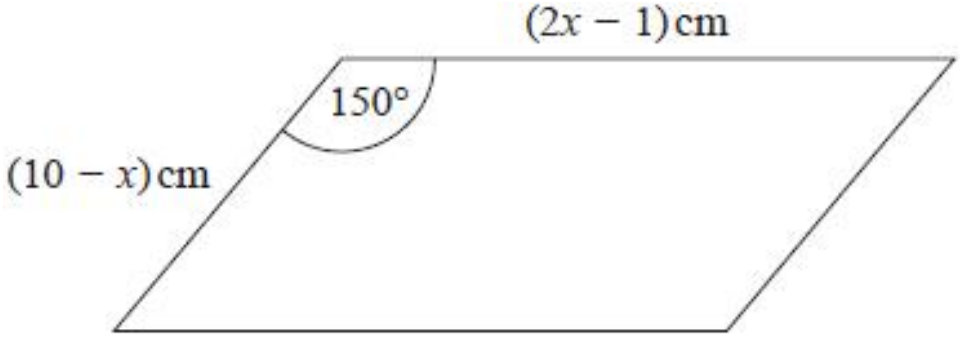
Q5. The area of triangle ABC is $6\sqrt{2}$ m^2.
Calculate the value of x.
Give your answer correct to 3 significant figures.



$x =$ .....

(Total 5 marks)

Q6. The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

(3)

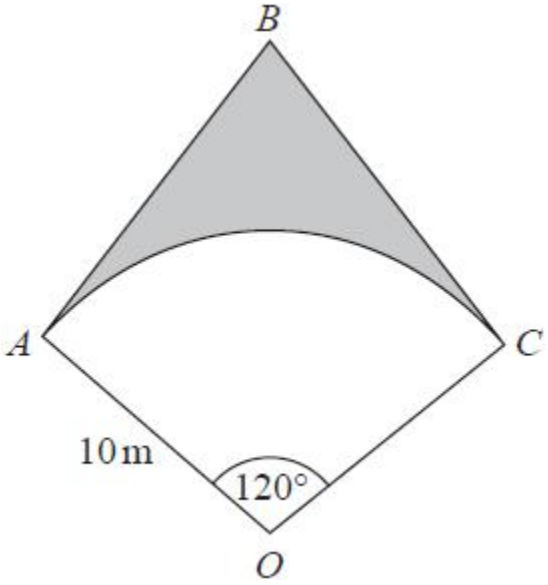
(b) Find the range of possible values of x.

……

(3)

(Total 6 marks)

Q7. OAC is a sector of a circle, centre O, radius 10 m.
BA is the tangent to the circle at point A.
BC is the tangent to the circle at point C.
Angle AOC = 120°



Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

…… m^2
(Total 5 marks)

Q8. There is a coastguard station at point A and at point B.
B is due East of A.
The distance from A to B is 12 km.

There is a rowing boat at point R.
R is on a bearing of 160° from A.
R is on a bearing of 220° from B.
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Give your answer correct to 1 decimal place.
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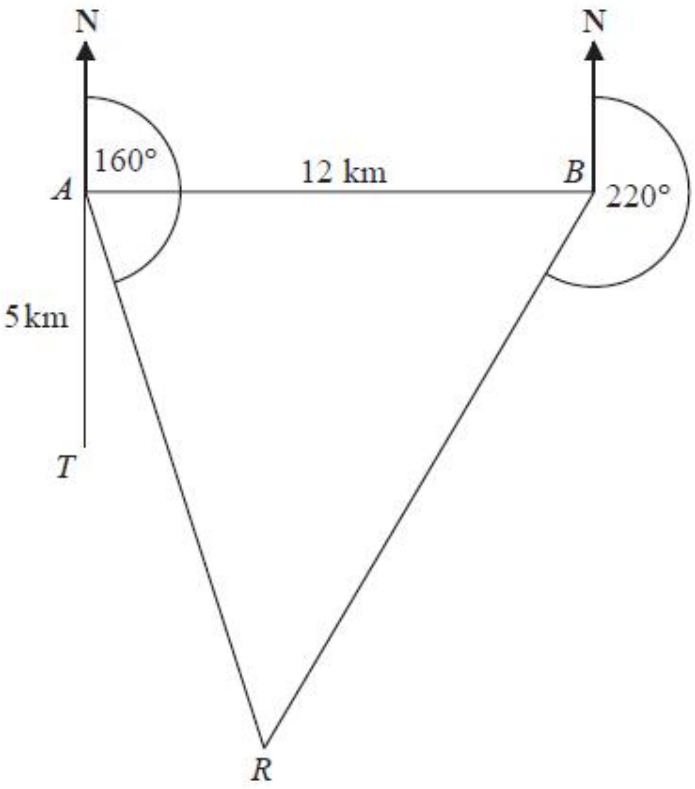


…… km
(Total 5 marks)

Q9. Jerry wants to cover a triangular field, ABC, with fertiliser.

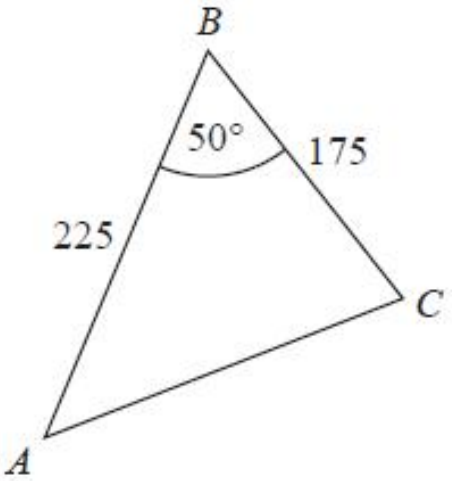


Diagram **NOT** accurately drawn

Here are the measurements Jerry makes

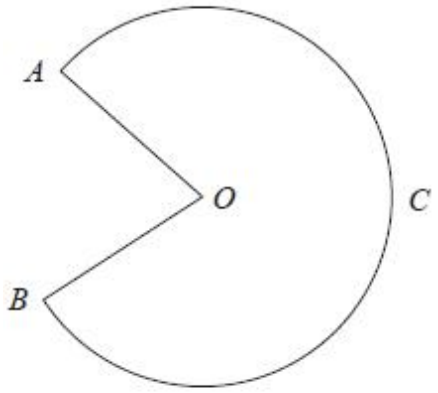
angle ABC = 50° correct to the nearest degree,
BA = 225 m correct to the nearest 5 m,
BC = 175 m correct to the nearest 5 m.

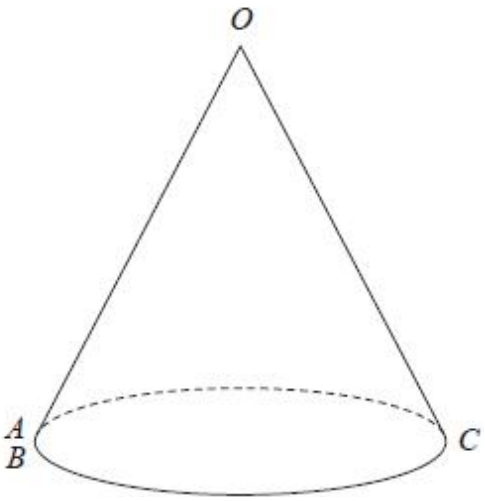
Work out the upper bound for the area of the field.
You must show your working.

..... m^2

(Total 3 marks)

Q10. The diagram shows a sector $OACB$ of a circle with centre O.



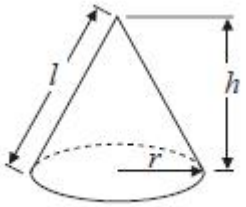


The point C is the midpoint of the arc AB.
The diagram also shows a hollow cone with vertex O.
The cone is formed by joining OA and OB.

The cone has volume 56.8 cm^3 and height 3.6 cm.
Calculate the size of angle AOB of sector $OACB$.
Give your answer correct to 3 significant figures.
You must show all your working.

Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$



…… °

(Total 5 marks)

Trigonometry Exam Questions

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Work out the area of triangle ABC.
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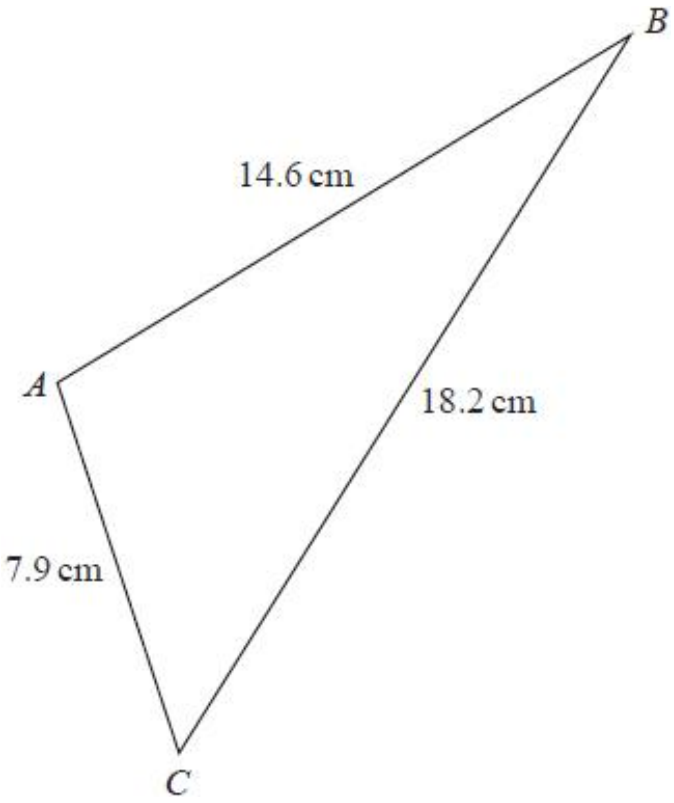


$\angle BAC = \cos^{-1}\left(\frac{14.6^2 + 7.9^2 - 18.2^2}{2 \times 14.6 \times 7.9}\right)$

$= 103.96...°$

(or $\angle ABC = 24.91...°$
or $\angle ACB = 51.12...°$)

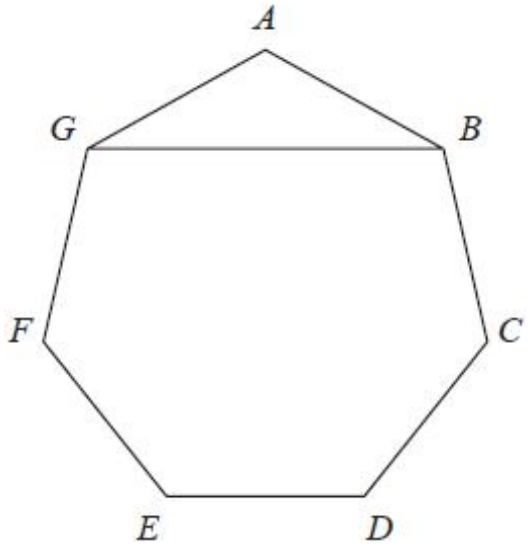
Area $= \frac{1}{2} \times 14.6 \times 7.9 \times \sin 103.96...$

$= 55.965... cm^2$

56.0 ..... cm^2

(Total 4 marks)

Q2. $ABCDEFG$ is a regular heptagon.



The area of triangle ABG is 30 cm^2
Calculate the length of GB.
Give your answer correct to 3 significant figures.
You must show all your working.

Ext. angle : $360 \div 7 = 51.42...^\circ$

Int. angle : $180 - 51.42... = 128.57...^\circ$ (A)

$\frac{1}{2} x^2 \times \sin 128.57... = 30$

$x^2 = 76.74...$

$x = 8.760...$ (B)

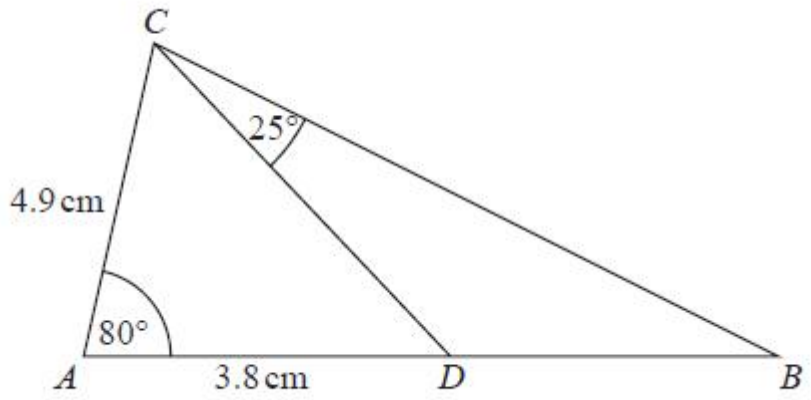
$GB = \sqrt{8.76...^2 + 8.76...^2 - 2 \times 8.76...^2 \cos 128.57...}$

$= 15.785...$

15.8 ..... cm

(Total 5 marks)

Q3. ABC is a triangle.



D is a point on AB.
Work out the area of triangle BCD.
Give your answer correct to 3 significant figures.

$CD = \sqrt{4.9^2 + 3.8^2 - 2 \times 4.9 \times 3.8 \times \cos 80}$

$= 5.65...$ cm (A)

$\angle CDA = \sin^{-1}\left(\frac{4.9 \times \sin 80}{5.65...}\right) = 58.56...^\circ$ (B)

$\angle CDB = 180 - 58.56... = 121.43...^\circ$ (C)

$\angle CBD = 180 - (121.43... + 25) = 33.56...^\circ$ (D)

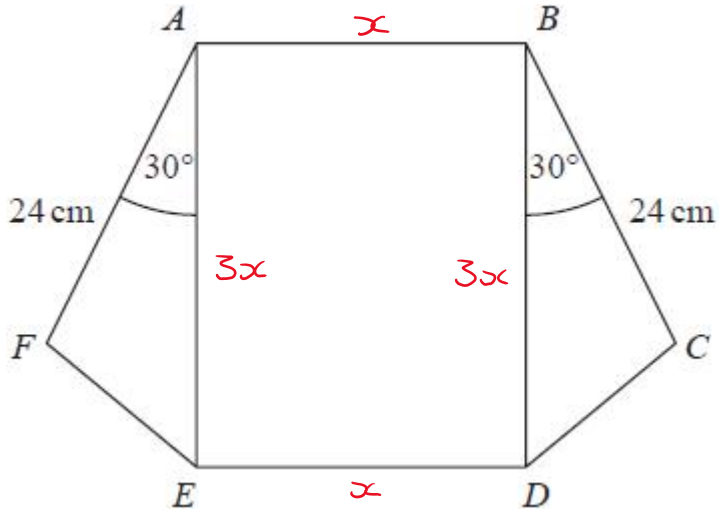
$DB = \frac{5.65... \times \sin 25}{\sin 33.56...} = 4.32...$ cm (E)

Area $= \frac{1}{2} \times 5.65... \times 4.32... \times \sin 121.43...$

$= 10.429...$

10.4 ..... cm^2
(Total 5 marks)

Q4. The diagram shows a rectangle, $ABDE$, and two congruent triangles, AFE and BCD.



area of rectangle $ABDE$ = area of triangle AFE + area of triangle BCD

$AB : AE = 1 : 3$

Work out the length of AE.

Area of rectangle $= 3x^2$

Area of triangle $AFE = \frac{1}{2} \times 24 \times 3x \times \sin 30 = 18x$

$3x^2 = 36x$

$3x^2 - 36x = 0$

$x(x-12) = 0 \quad \therefore x = 0 \text{ or } 12$

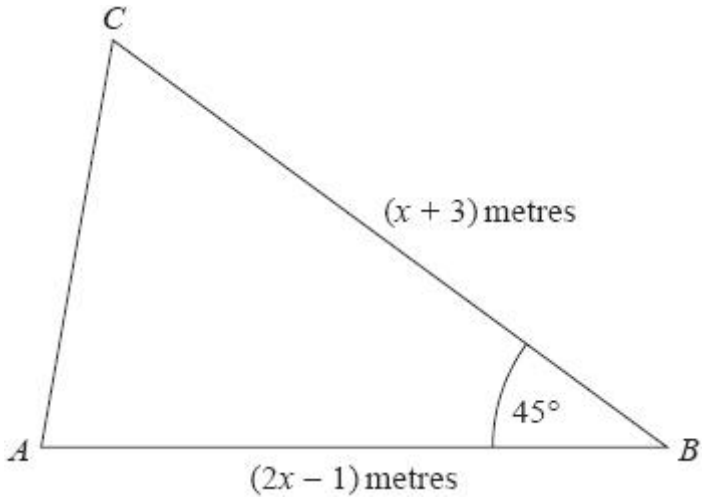
$x > 0 \quad \therefore x = 12$

$AE = 3 \times 12 = 36$

36 ..... cm

(Total 4 marks)

Q5. The area of triangle ABC is $6\sqrt{2}$ m^2.
Calculate the value of x.
Give your answer correct to 3 significant figures.



$\frac{1}{2}(2x-1)(x+3)\sin 45 = 6\sqrt{2}$

$(2x^2+5x-3)\frac{\sqrt{2}}{2} = 12\sqrt{2}$

$2x^2+5x-3 = 24$

$2x^2+5x-27 = 0$

$a=2 \quad b=5 \quad c=-27$

$x = \frac{-5 \pm \sqrt{5^2-4\times 2\times -27}}{2\times 2}$

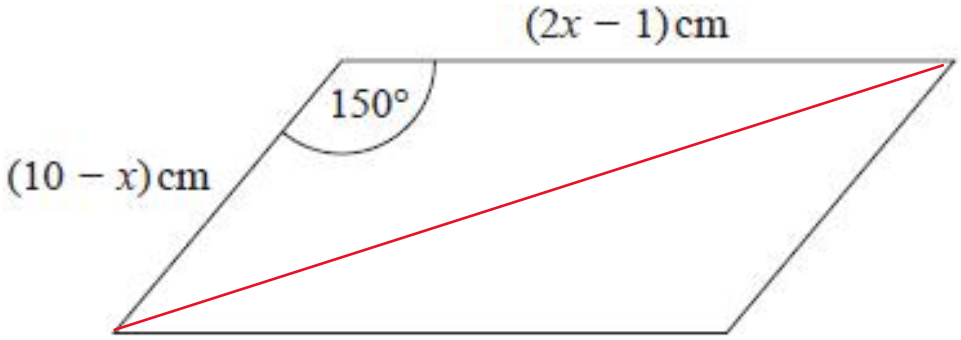
$x = 2.631\ldots \quad \text{or} \quad -5.131\ldots$

$x > -3 \quad \therefore \quad x = 2.63$

$x =$ 2.63

(Total 5 marks)

Q6. The diagram shows a parallelogram.



The area of the parallelogram is greater than 15 cm^2

(a) Show that $2x^2 - 21x + 40 < 0$

$2 \times \frac{1}{2}(10-x)(2x-1)\sin 150 > 15$

$(20x - 10 - 2x^2 + x)\frac{1}{2} > 15$

$-2x^2 + 21x - 10 > 30$

$0 > 2x^2 - 21x + 40$

(3)

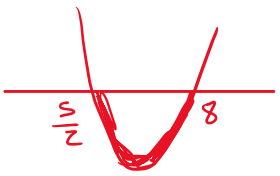
(b) Find the range of possible values of x.

$2x^2 - 21x + 40 < 0$

$(x-8)(2x-5) < 0$

Critical values: $8, \frac{5}{2}$

	$2x$	-5
x	$2x^2$	$-5x$
-8	$-16x$	$+40$



$\frac{5}{2} < x < 8$

.....

(3)

(Total 6 marks)

Q7. OAC is a sector of a circle, centre O, radius 10 m.
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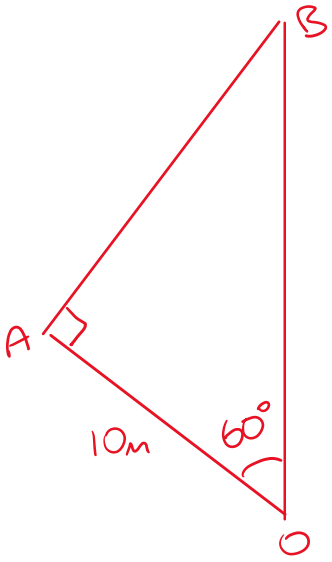
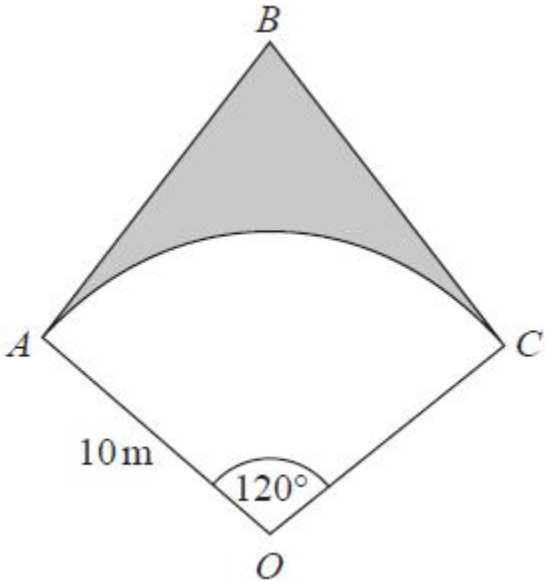
BC is the tangent to the circle at point C.
Angle AOC = 120°





Calculate the area of the shaded region.
Give your answer correct to 3 significant figures.

Area $OAC = \frac{120}{360} \times \pi \times 10^2 = \frac{100}{3}\pi$

$AB = \tan(60) \times 10 = 10\sqrt{3}$ cm

Area $OABC = 2 \times \frac{1}{2} \times 10 \times 10\sqrt{3} = 100\sqrt{3}$ cm^2

Shaded area $= 100\sqrt{3} - \frac{100}{3}\pi$

$= 68.485...$

68.5 ..... m^2
(Total 5 marks)

Q8. There is a coastguard station at point A and at point B.
B is due East of A.
The distance from A to B is 12 km.

There is a rowing boat at point R.
R is on a bearing of 160° from A.
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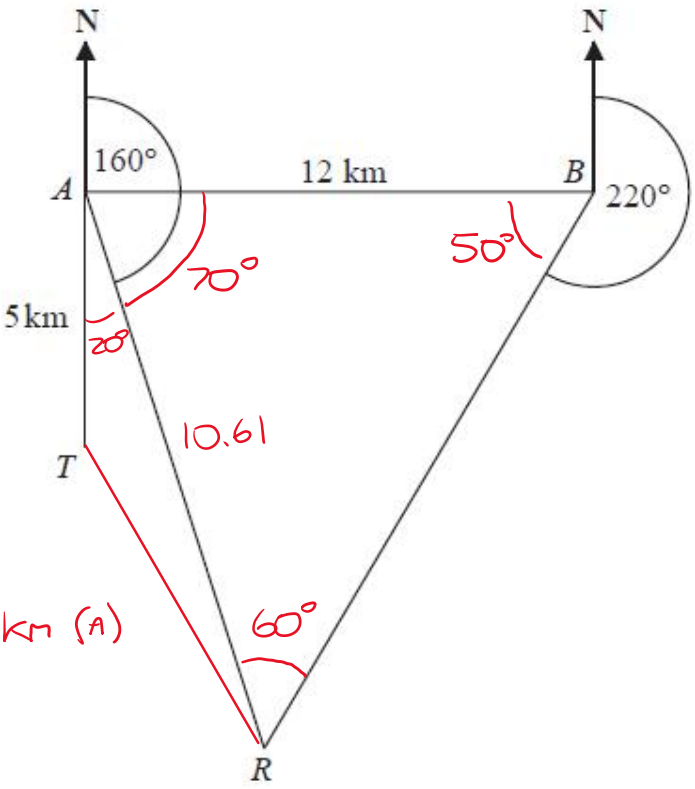


$AR = \frac{12 \sin 50}{\sin 60} = 10.61\ldots$ km (A)

$TR = \sqrt{5^2 + 10.61..^2 - 2 \times 5 \times 10.61\ldots \times \cos 20}$

$= 6.158\ldots$ km

6.2 ..... km

(Total 5 marks)

Q9. Jerry wants to cover a triangular field, ABC, with fertiliser.

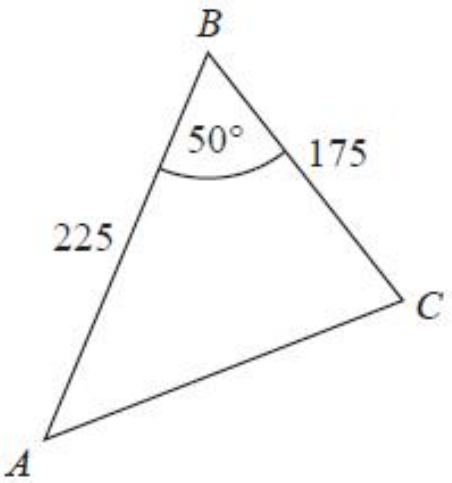


Diagram **NOT** accurately drawn

Here are the measurements Jerry makes

angle ABC = 50° correct to the nearest degree,
BA = 225 m correct to the nearest 5 m,
BC = 175 m correct to the nearest 5 m.

Work out the upper bound for the area of the field.
You must show your working.

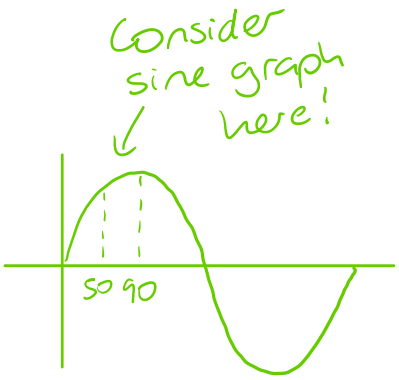
$49.5 \leq ABC < 50.5$

$222.5 \leq BA < 227.5$

$172.5 \leq BC < 177.5$

$UB = \frac{1}{2} \times 227.5 \times 177.5 \times \sin 50.5$

$= 15579.5826$



Greater angle will not always yield UB.

15579.5826 m²

(Total 3 marks)

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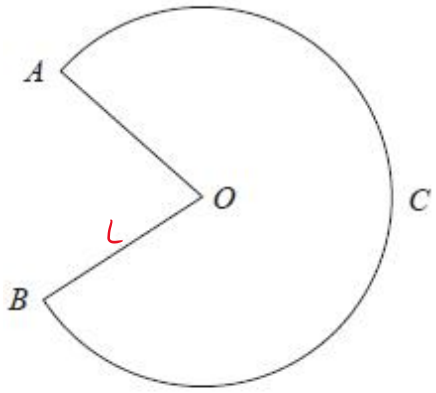

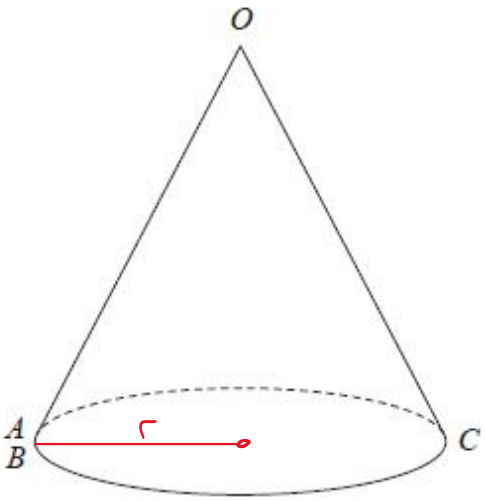

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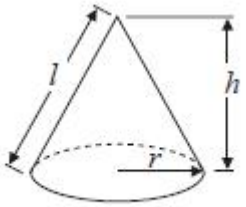
Curved surface area of cone $= \pi r l$



$56.8 = \frac{1}{3} \times \pi \times r^2 \times 3.6$

$r = 3.88\ldots$ cm (A)

$l = \sqrt{3.6^2 + 3.88\ldots^2}$

$= 5.29\ldots$ cm (B)

Curved SA $= \pi \times 3.88\ldots \times 5.29\ldots = 64.55\ldots$ cm^2 (C)

$\frac{\theta}{360} \times \pi \times 5.29\ldots^2 = 64.55\ldots$

$\theta = 263.95\ldots$

264 °

(Total 5 marks)