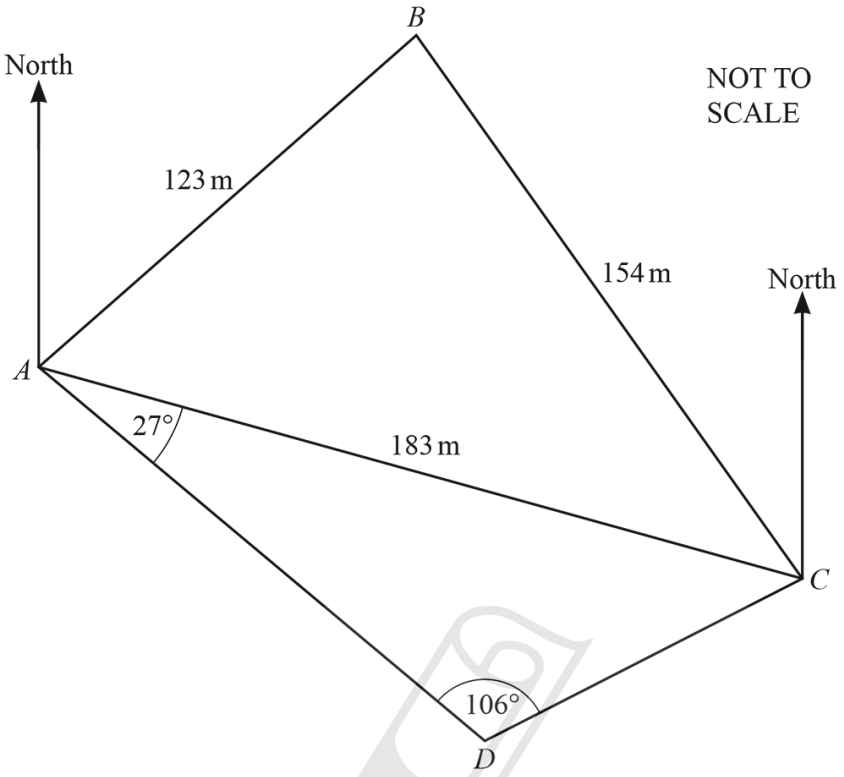
# Chapter 8

# Trigonometry

01. 0607_m24_qp_42 Q: 5




The diagram shows a field $ABCD$, with a straight path $AC$.
The bearing of $C$ from $A$ is 122°.

**(a)** Calculate the bearing of $D$ from $C$.



..... [3]

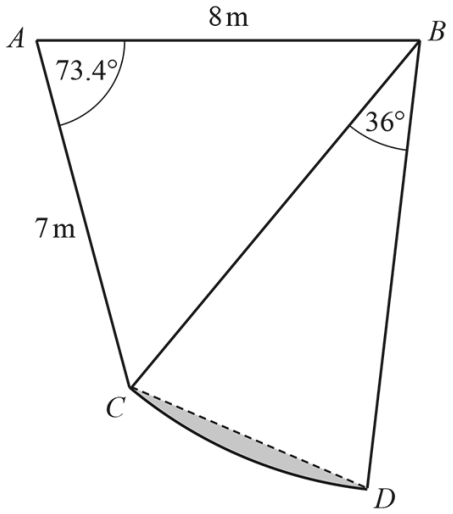
**(b)** Show that angle $ABC = 81.9°$ correct to one decimal place.

[3]

**(c)** Find the total area of the field $ABCD$.

..... $m^2$ [5]

02. 0607_s24_qp_41 Q: 8




NOT TO SCALE

The diagram shows a shape $ABDC$ formed from triangle $ABC$ and a sector of a circle $BCD$, centre $B$.

**(a)** Show that $BC = 9.0\,\text{m}$, correct to 1 decimal place.

[3]

**(b)** Use the sine rule to find angle $BCA$.



Angle $BCA$ = ..... [3]

**(c)** Find the area of triangle $ABC$.

..... $m^2$ [2]

**(d)** Find the area of the shaded region.

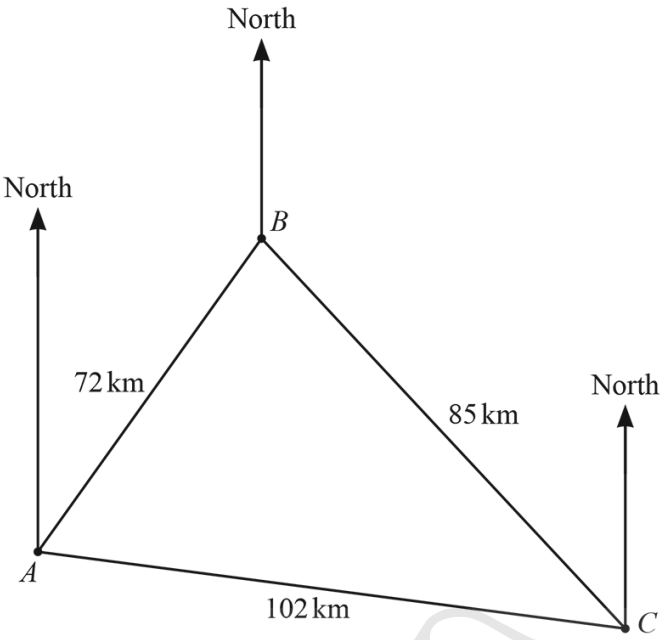
..... $m^2$ [3]

**(e)** Find the perimeter of the shape $ABDC$.



..... m [2]

03. 0607_s24_qp_43 Q: 11




$A$, $B$, and $C$ are three ports.
The bearing of $B$ from $A$ is 040°.

**(a)** Show that angle $ABC = 80.6°$, correct to 1 decimal place.



[3]

**(b)** Find the bearing of $B$ from $C$.

..... [2]

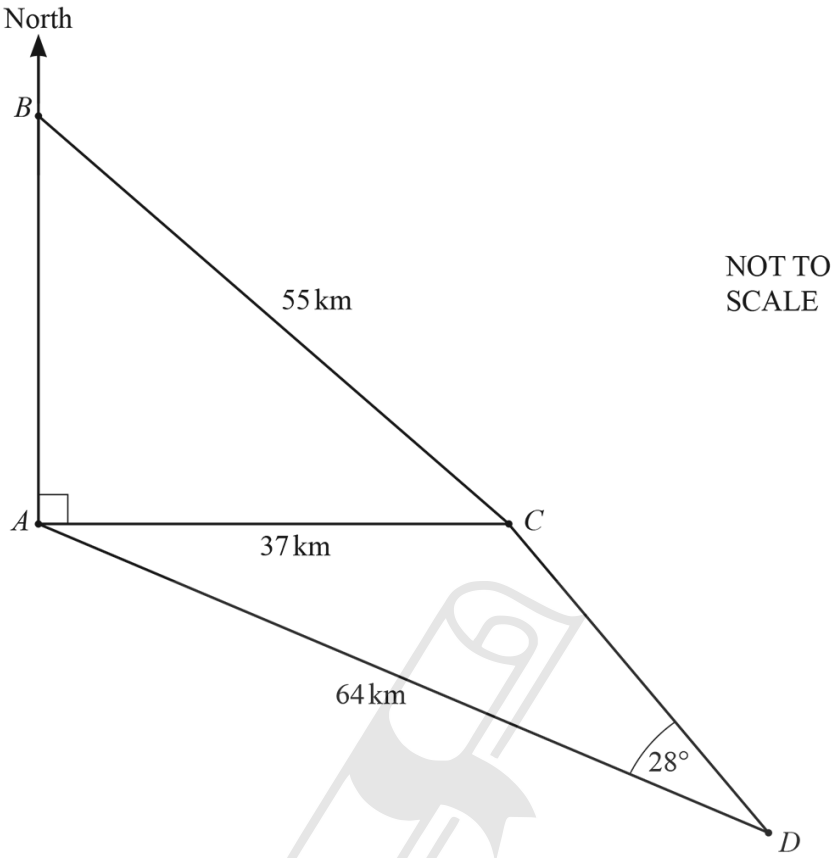
**(c)** A ship leaves port $A$ at 13 00.
It sails directly towards $C$ at a speed of 32 km/h.
At point $P$ the ship is at its shortest distance from $B$.

Find the time when the ship reaches point $P$.
Give your answer correct to the nearest minute.



..... [6]

04. 0607_m23_qp_42 Q: 8




The diagram shows four points $A$, $B$, $C$ and $D$ on level ground.
$B$ is due north of $A$ and $C$ is due east of $A$.

**(a)** Calculate $AB$.



$AB =$ ..... km [3]

**(b)** Calculate the obtuse angle $ACD$.

Angle $ACD$ = ..... [3]

**(c)** Find the bearing of

**(i)** $D$ from $A$

..... [2]

**(ii)** $A$ from $D$.

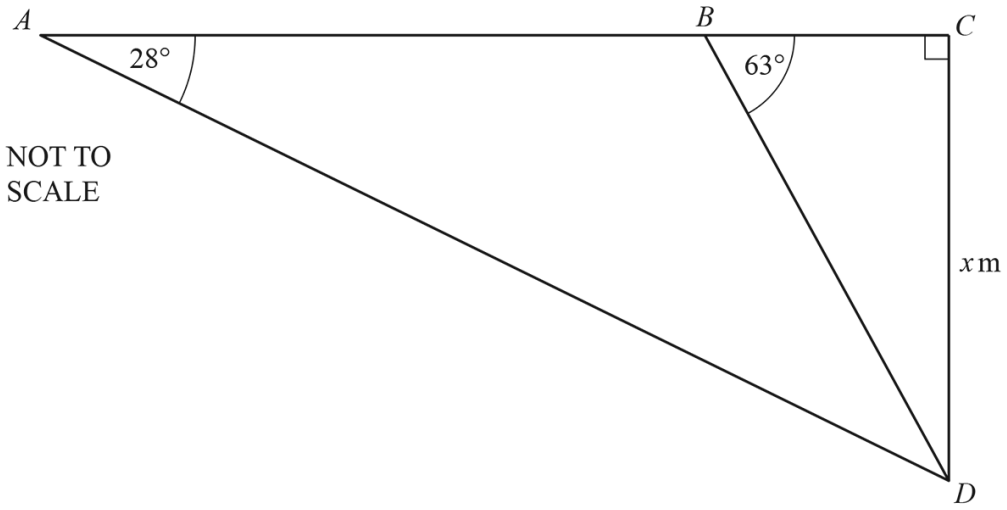
..... [1]

**(d)** Calculate the area of the quadrilateral $ABCD$.



..... $km^2$ [3]

05. 0607_m23_qp_42 Q: 10




A plane is flying in a straight line $ABC$ at a constant height, $x$ metres, above ground level.
The point $D$ is on the ground directly below $C$.

The plane is travelling at a constant speed of 480 km/h.
The time taken for the plane to travel from $A$ to $B$ is 18 seconds.

**(a)** Show that, in metres, $AC = \frac{x}{\tan 63} + 2400$ .

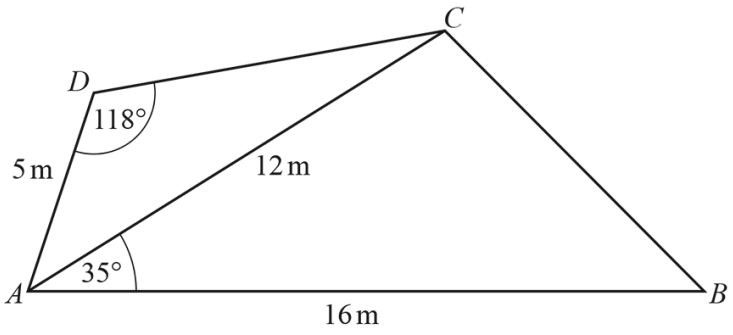


[3]

**(b)** Find the value of $x$.

$x =$ ..... [5]

06. 0607_s23_qp_41 Q: 9




NOT TO SCALE

**(a)** $B$ is due east of $A$.

Find the bearing of $A$ from $C$.

..... [2]

**(b)** Calculate the area of triangle $ABC$.

..... $m^2$ [2]

**(c)** Calculate angle $CAD$.

Angle $CAD$ = ..... [4]

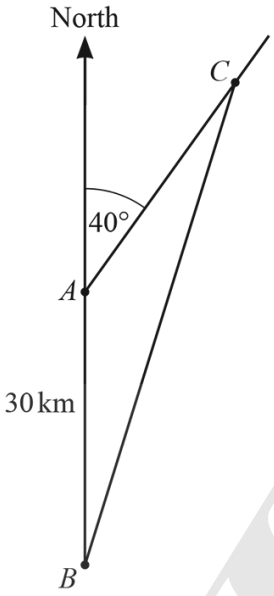
**(d)** Calculate the length of the straight line *BD*.

..... m [3]

07. 0607_s23_qp_42 Q: 8

A ship sails from port $A$ at a constant speed of 18 km/h on a bearing of 040°.
A motorboat sails in a straight line at a constant speed from port $B$ to intercept the ship.

Port $B$ is 30 km due south of port $A$.
The ship leaves port $A$ at 08 20 and the motorboat leaves port $B$ at 08 30.
The motorboat intercepts the ship at point $C$ at 09 50.




NOT TO SCALE

**(a)** Find the speed of the motorboat.

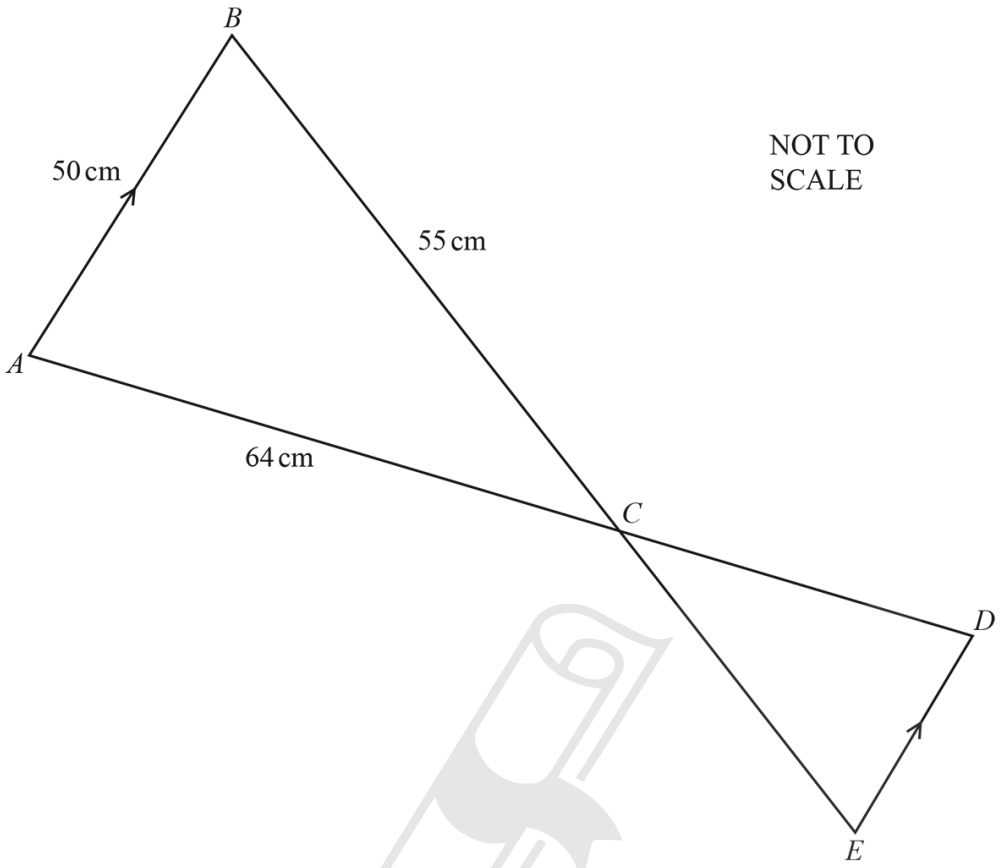


..... km/h [5]

**(b)** Find the bearing on which the motorboat sails.

..... [3]

08. 0607_s23_qp_43 Q: 5




In the diagram, $AB$ is parallel to $ED$.
$ACD$ and $BCE$ are straight lines.
$AB = 50$ cm, $BC = 55$ cm and $AC = 64$ cm.

**(a)** Show that angle $ACB = 49.0°$ correct to one decimal place.



[3]

**(b)** Use the sine rule to calculate angle $CAB$.

Angle $CAB$ = ..... [3]

**(c)** Calculate the area of triangle $ABC$.

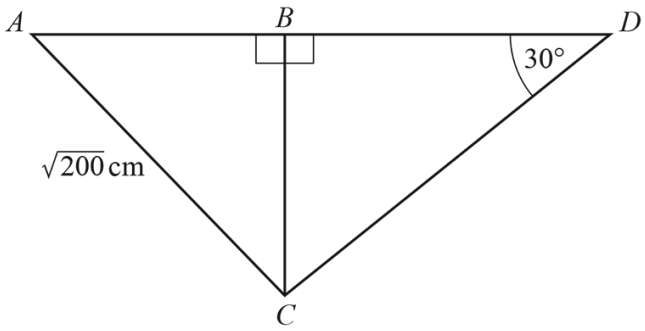
..... $cm^2$ [2]

**(d)** $AC = \frac{2}{3}AD$

Calculate the area of triangle $CDE$.

..... $cm^2$ [2]

09. 0607_s23_qp_43 Q: 12




NOT TO SCALE

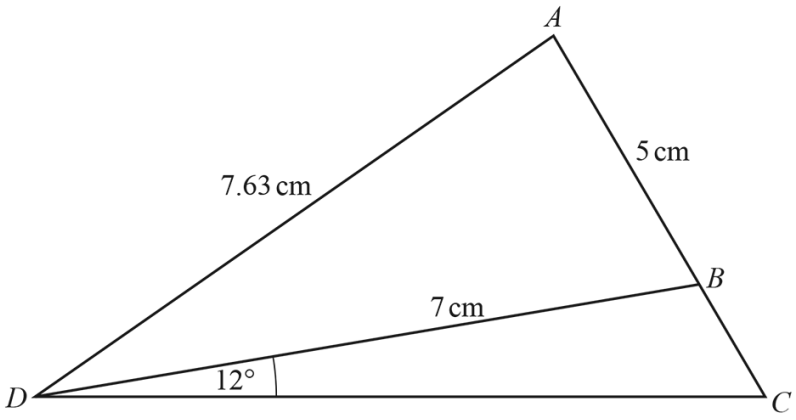
The diagram shows two right-angled triangles $ABC$ and $CBD$.
$AB = BC$, $AC = \sqrt{200}$ cm and angle $BDC = 30°$.

Find the perimeter of triangle $ACD$.



..... cm [6]

10. 0607_w23_qp_42 Q: 7




NOT TO SCALE

In triangle $ACD$, $AB = 5\,\text{cm}$, $AD = 7.63\,\text{cm}$ and $BD = 7\,\text{cm}$.
Angle $BDC = 12°$.

**(a)** Show that angle $ABD = 77.0°$ correct to 1 decimal place.

[3]

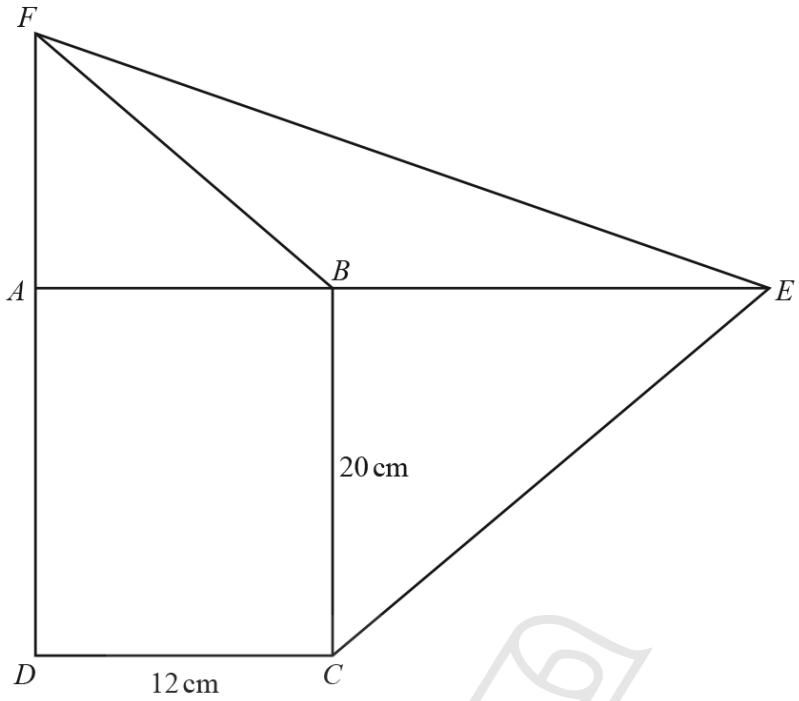
**(b)** Calculate the area of triangle $ABD$.

..... $\text{cm}^2$ [2]

**(c)** Calculate $BC$.

..... cm [4]

11. 0607_s21_qp_41 Q: 9




NOT TO SCALE

The diagram shows rectangle *ABCD* and two right-angled isosceles triangles, *ABF* and *BCE*.

**(a)** Find the perimeter of the quadrilateral *CDFE*.



..... cm [3]

**(b) (i)** Find the area of the quadrilateral *CDFE*.

..... $cm^2$ [3]

**(ii)** Quadrilateral *Q* is similar to quadrilateral *CDFE*.
The area of quadrilateral *Q* is $158\,cm^2$.

Find the length of the shortest side of quadrilateral *Q*.

..... cm [2]

**(c)** Calculate angle *AFE*.

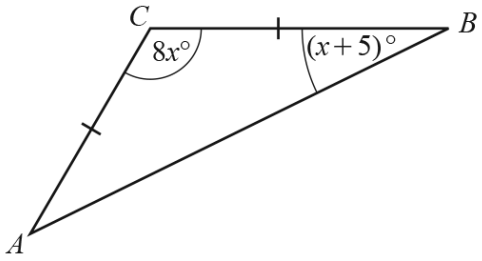


Angle *AFE* = ..... [2]

12. 0607_s21_qp_43 Q: 7

In this question all lengths are in centimetres.

**(a)**



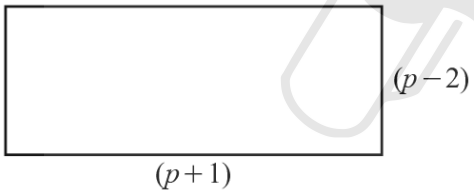

NOT TO SCALE

In triangle $ABC$, $AC = BC$, angle $ABC = (x+5)°$ and angle $ACB = 8x°$.

Find the value of $x$.

$x =$ ..... [3]

**(b)**



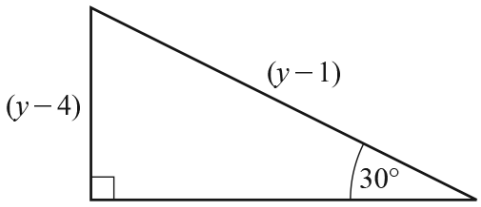

NOT TO SCALE

The diagram shows a rectangle with sides of length $(p+1)$ and $(p-2)$.
The area of the rectangle is $90\,\text{cm}^2$.

Find the value of $p$.

$p =$ ..... [4]

**(c)**



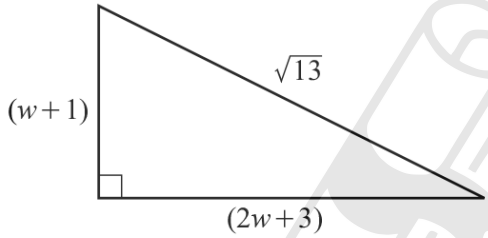

NOT TO SCALE

The diagram shows a right-angled triangle.

Find the value of $y$.

$y =$ ..... [3]

**(d)**




NOT TO SCALE

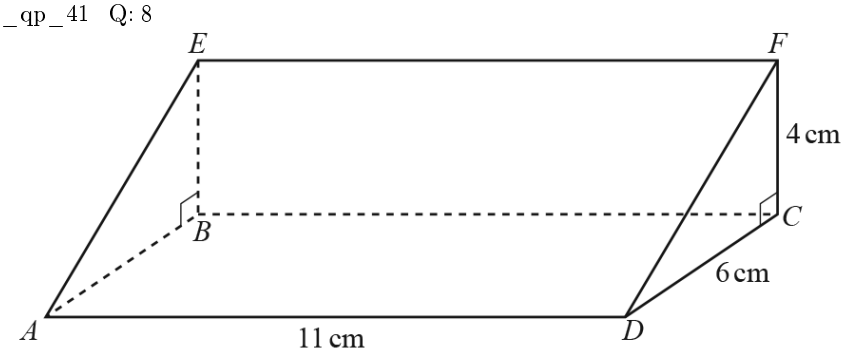
The diagram shows a right-angled triangle with sides of length $(w+1)$, $(2w+3)$ and $\sqrt{13}$.

Work out the area of the triangle.



..... $cm^2$ [6]

13. 0607_w21_qp_41 Q: 8




NOT TO SCALE

The diagram shows a right-angled triangular prism.
$ABCD$, $ADFE$ and $BCFE$ are rectangles.
$AD = 11$ cm, $DC = 6$ cm and the height $CF = 4$ cm.

**(a)** Calculate the volume of the prism.

..... $cm^3$ [2]

**(b)** Calculate the total surface area of the prism.



..... $cm^2$ [4]

**(c)** Calculate the length $AF$.

$AF =$ ..... cm [3]

**(d)** Calculate angle $FAC$.

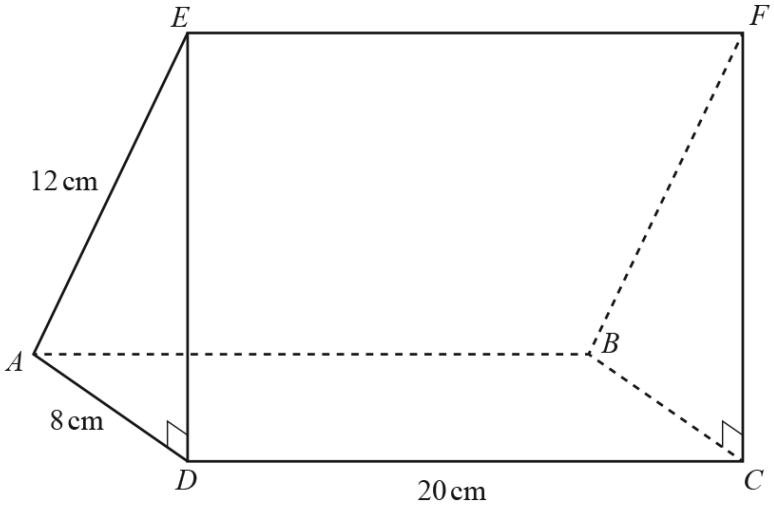
Angle $FAC$ = ..... [2]

**(e)** The volume of a mathematically similar prism is $445.5\,cm^3$.

Calculate the total surface area of this similar prism.

..... $cm^2$ [3]

14. 0607_w20_qp_41 Q: 8




NOT TO SCALE

*ABCDEF* is a triangular prism.
*ABCD* is a rectangle.

Find

**(a)** *AC*,

*AC* = .....cm [2]

**(b)** *ED*,



*ED* = .....cm [2]

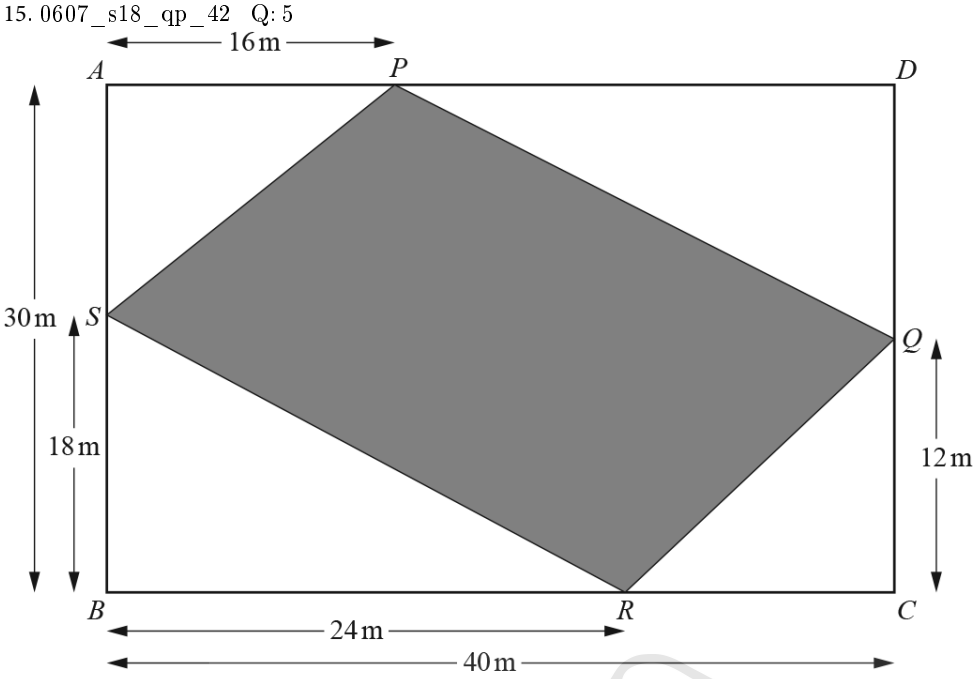
**(c)** angle $EAD$,

Angle $EAD$ = ..... [2]

**(d)** angle $FAC$.

Angle $FAC$ = ..... [2]

15. 0607_s18_qp_42 Q: 5




NOT TO SCALE

In the diagram, $ABCD$ is a rectangle.

**(a)** Find $PS$.

$PS =$ ..... m [2]

**(b)** Find angle $BRS$.

Angle $BRS =$ ..... [2]

**(c)** Find the perimeter of $PQRS$.

..... m [3]

**(d)** Find the shaded area.

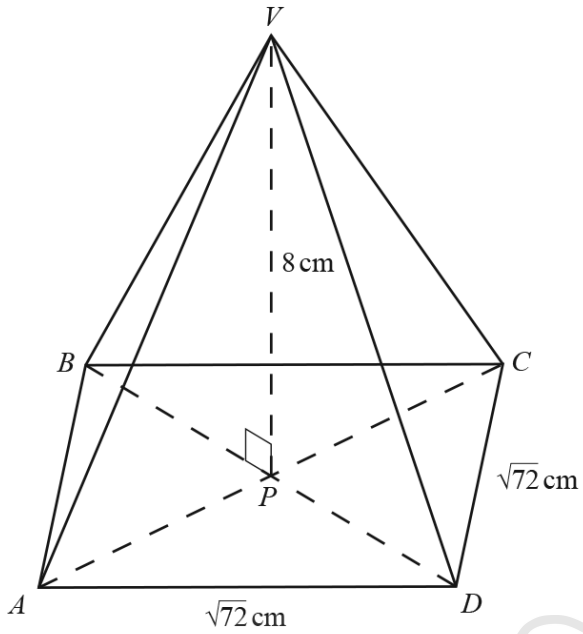
..... $m^2$ [3]

**(e)** Explain why triangle *ASP* is similar to triangle *BSR*.

.....

..... [2]

16. 0607_w17_qp_43 Q: 6




NOT TO SCALE

The diagram shows a pyramid with a square base $ABCD$ of side $\sqrt{72}$ cm.
The diagonals of the base, $AC$ and $BD$, meet at $P$.
The vertex, $V$, is vertically above $P$ and $VP = 8$ cm.

**(a)** Find the volume of the pyramid.
Give the units of your answer.

..... ..... [3]

**(b)** Find the length $AC$.

$AC =$ ..... cm [2]

**(c)** Find the length $DV$.

$DV =$ ..... cm [3]

**(d)** Find angle $VDP$.

Angle $VDP =$ ..... [2]

**(e)** $X$ is the midpoint of the side $CD$.

**(i)** Find the length $VX$.

$VX =$ ..... cm [3]

**(ii)** Find angle $VXP$.



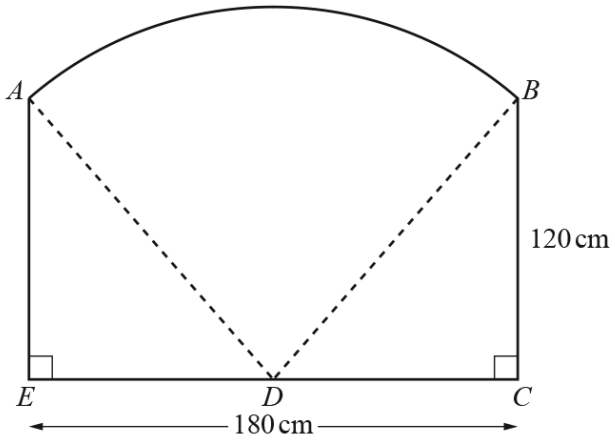
Angle $VXP =$ ..... [2]

**(f)** The pyramid is cut parallel to $ABCD$ to form a smaller pyramid $VEFGH$.
The volume of $VEFGH$ is $24\,cm^3$.

Find the vertical height of this pyramid.

..... cm [3]

17. 0607_s15_qp_42 Q: 6




The diagram shows a fence panel $ABCDE$.
The vertical edges $AE$ and $BC$ are of length 120 cm and the horizontal base $EC$ is of length 180 cm.
$D$ is the midpoint of $EC$.

**(a)** Calculate $AD$.

*Answer(a)* ..... cm [2]

**(b)** Show that angle $ADB = 73.74°$ correct to 2 decimal places.



[3]

**(c)** $AB$ is an arc of a circle centre $D$.
Find the area of the fence panel.

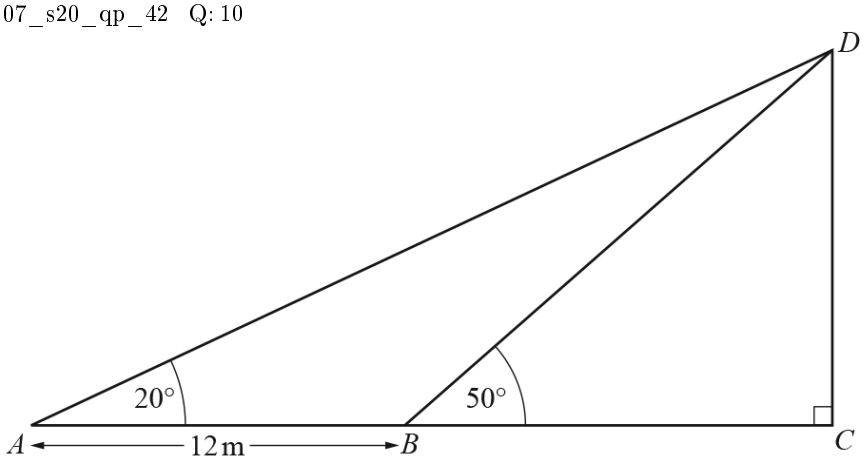
*Answer(c)* .....$cm^2$ [3]

**(d)** Stefan's fence has 8 panels, each identical to *ABCDE*.
He wishes to paint both sides of all the panels.
Each litre of paint covers an area of 6 **square metres**.

Calculate the number of litres Stefan needs to paint **both** sides of the whole fence.

*Answer(d)* ..... litres [3]

18. 0607_s20_qp_42 Q: 10




NOT TO SCALE

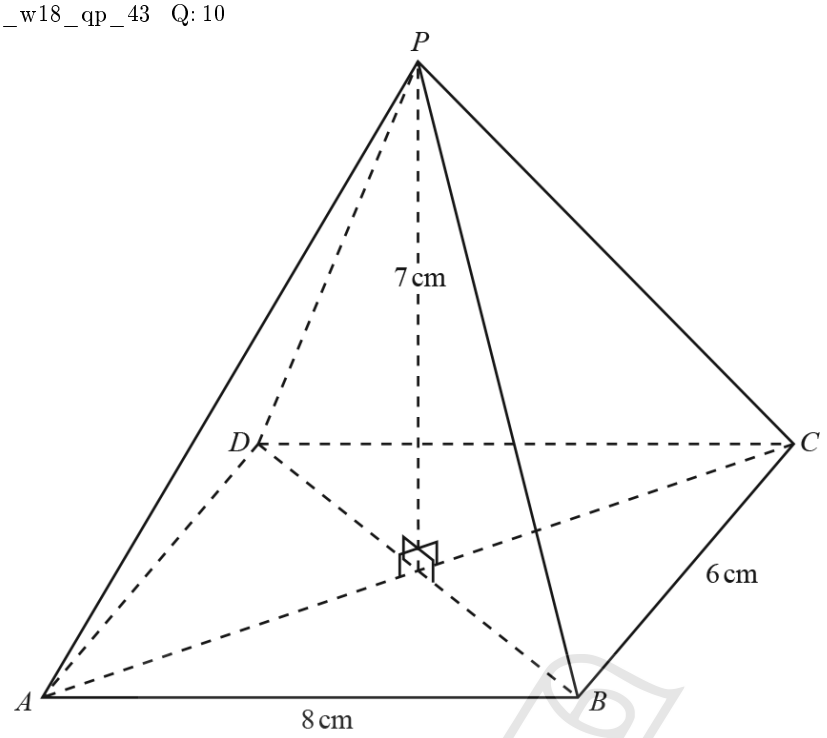
The diagram shows a vertical pole $CD$.
$ABC$ is a straight line on level ground.

Find $DC$.



$DC =$ ..... m [6]

19. 0607_w18_qp_43 Q: 10




NOT TO SCALE

The diagram shows a pyramid of height 7 cm on a rectangular base 8 cm by 6 cm.
The point $P$ is directly above the centre of the base.

**(a)** Calculate the angle between the triangle $PBC$ and the base $ABCD$.

..... [2]

**(b)** Calculate the angle between $PB$ and the base $ABCD$.

..... [3]

**(c)** Calculate $PC$.

$PC =$ ..... cm [2]

**(d)** Calculate angle $PCB$.

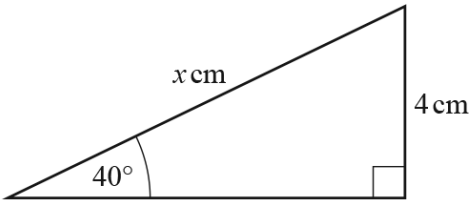
Angle $PCB$ = ..... [2]

**(e)** $X$ is a point on the line $PC$ so that angle $BXC = 60°$.

Calculate $BX$.

$BX$ = ..... cm [3]

20. 0607_m22_qp_42 Q: 9

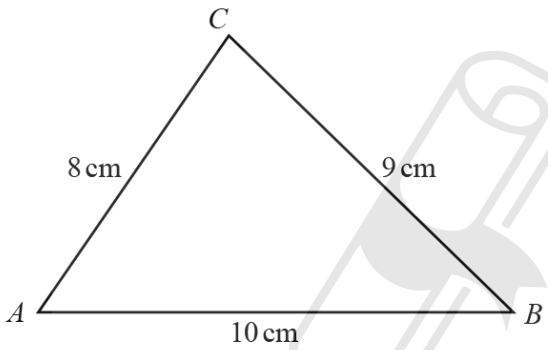



NOT TO SCALE

Calculate the value of $x$.

$x =$ ..... [3]

**(b)**




NOT TO SCALE

**(i)** Calculate angle $ABC$.



Angle $ABC =$ ..... [3]

**(ii)** $T$ is the point on $AB$ that is the shortest distance from $C$.

Calculate $BT$.

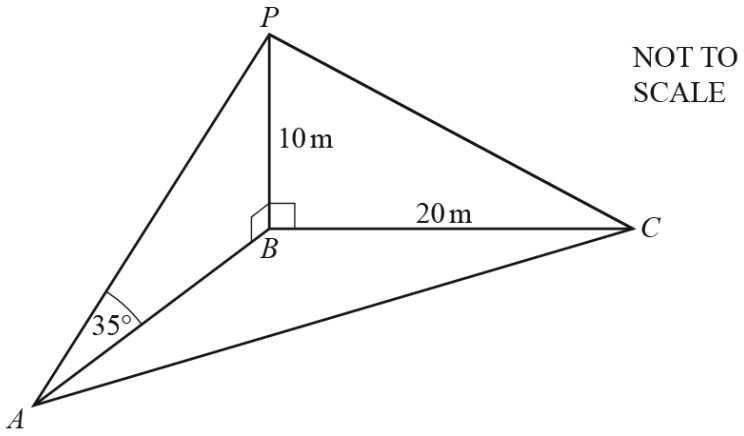
$BT =$ ..... cm [3]

**(c)** Another triangle $PQR$ has $QR = 12\,\text{cm}$, $PR = 7\,\text{cm}$ and angle $PQR = 35°$.

Calculate the difference between the two possible values of angle $QPR$.

..... [5]

21. 0607_s21_qp_42 Q: 5




$A$, $B$ and $C$ are points on horizontal ground.
$BP$ is a vertical pole.
$BC = 20$ m and $BP = 10$ m.
Angle $PAB = 35°$.

**(a)** Show that $PC = 22.36$ m correct to 2 decimal places.

[2]

**(b)** Show that $AB = 14.28$ m correct to 2 decimal places.

[2]

**(c)** Calculate $AP$.

$AP =$ ..... m [2]

**(d)** Angle $ABC = 125°$.

Calculate $AC$.

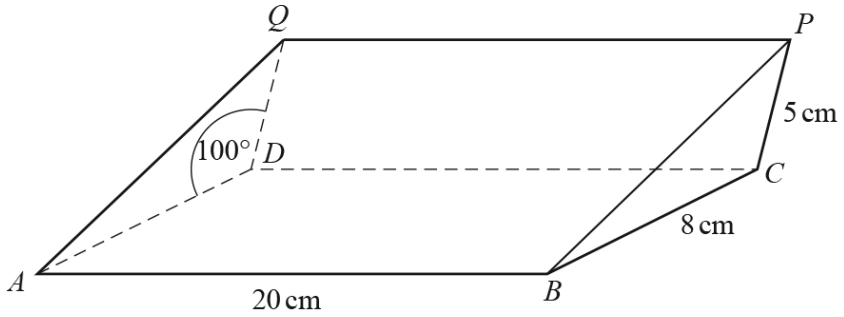
$AC =$ ..... m [3]

**(e)** Calculate angle $APC$.



Angle $APC =$ ..... [3]

22. 0607_w21_qp_42 Q: 11




NOT TO SCALE

The diagram shows a solid triangular prism of length 20 cm.
The cross-section of the prism is triangle $BCP$ and three faces are rectangles.
$BC = 8$ cm, $CP = 5$ cm and angle $ADQ$ = angle $BCP = 100°$.

**(a)** Calculate the total surface area of the prism.



..... $cm^2$ [7]

**(b) (i)** On the diagram of the prism, draw two straight lines and mark angle $PAC$. [1]

**(ii)** Angle $APC = 73.45°$.

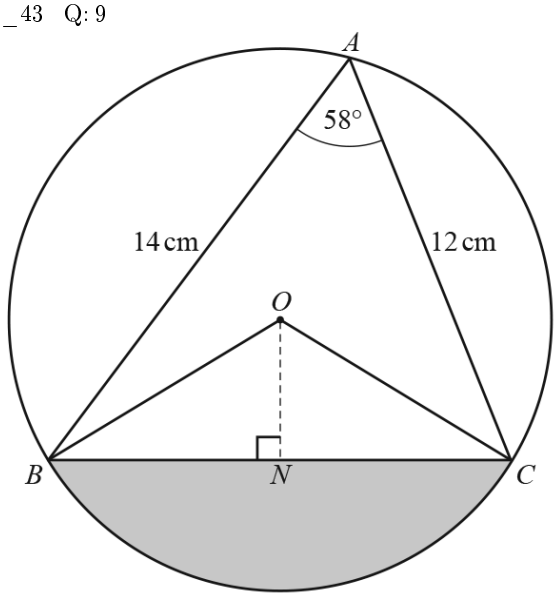
Calculate angle $PAC$.





Angle $PAC =$ ..... [4]

23. 0607_w19_qp_43 Q: 9




NOT TO SCALE

$A$, $B$ and $C$ are points on the circle, centre $O$.
$ON$ is perpendicular to $BC$.
$AB = 14$ cm, $AC = 12$ cm and angle $BAC = 58°$.

**(a)** Show that $BC = 12.73$ cm, correct to 2 decimal places.

[3]

**(b)** Explain why angle $BON = 58°$.

.....

..... [1]

**(c)** Calculate $OB$, the radius of the circle.

$OB =$ ..... cm [3]

**(d)** Calculate the area of the shaded segment.

.....$cm^2$ [3]

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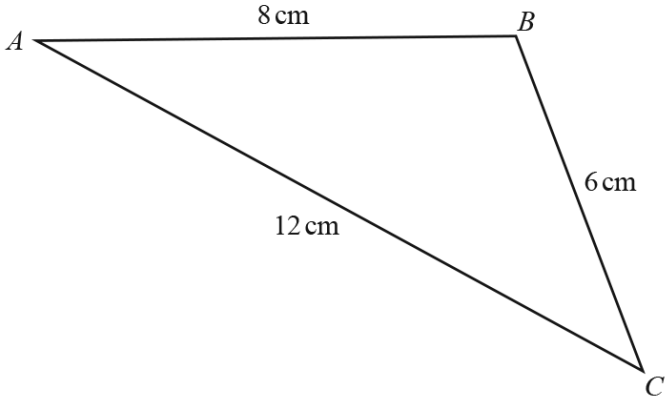
24. 0607_s17_qp_41 Q: 9




NOT TO SCALE

The diagram shows triangle $ABC$.

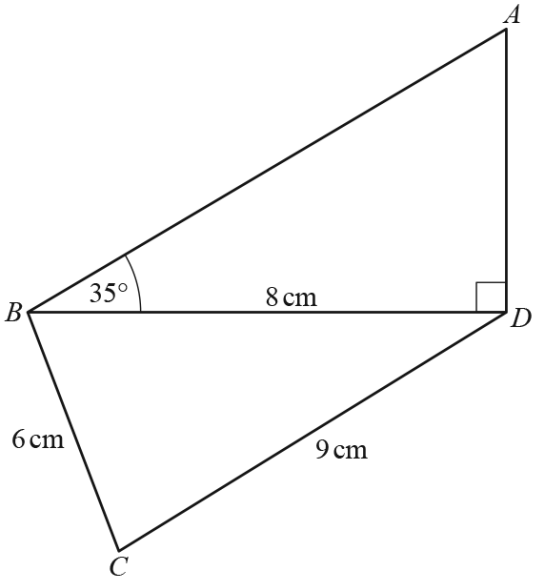
**(a)** Use the cosine rule to find angle $ABC$.

Angle $ABC$ = ..... [3]

**(b)** Use the sine rule to find angle $BAC$.

Angle $BAC$ = ..... [3]

25. 0607_s17_qp_43 Q: 7




NOT TO SCALE

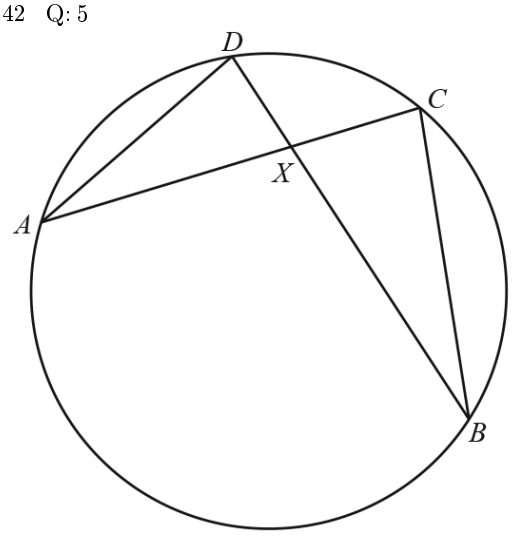
**(a)** Calculate $AB$.

$AB$ = ..... cm [3]

**(b)** Calculate angle $BCD$.

Angle $BCD$ = ..... [3]

26. 0607_s16_qp_42 Q: 5




NOT TO SCALE

$A$, $B$, $C$ and $D$ lie on the circle.
The chords $AC$ and $BD$ intersect at $X$.

**(a)** Show that triangles $ADX$ and $BCX$ are similar.
Give a reason for each statement that you make.

[2]

**(b)** $AX = 5$ cm, $DX = 2$ cm and $CX = 3$ cm.

Calculate $BX$.

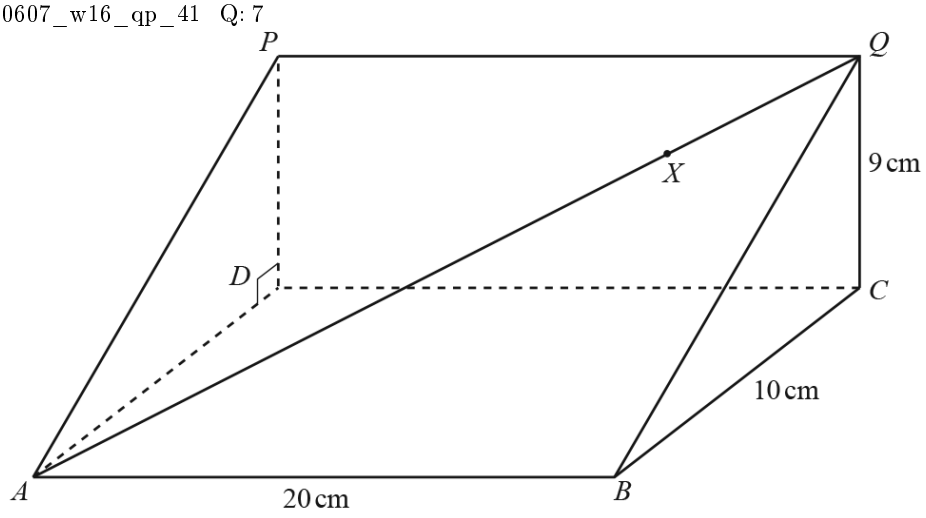
$BX =$ ..... cm [2]

**(c)** $AD = 4.61$ cm.

Calculate angle $AXD$.

Angle $AXD =$ ..... [3]

27. 0607_w16_qp_41 Q: 7




NOT TO SCALE

The diagram shows a triangular prism with a horizontal base $ABCD$.
$X$ is a point on the line $AQ$.
$AB = 20$ cm, $BC = 10$ cm, $CQ = 9$ cm and angle $BCQ = 90°$.

**(a)** Calculate angle $QBC$.

Angle $QBC$ = ..... [2]

**(b)** Calculate angle $BAQ$ and show that it rounds to 33.9°, correct to 1 decimal place.

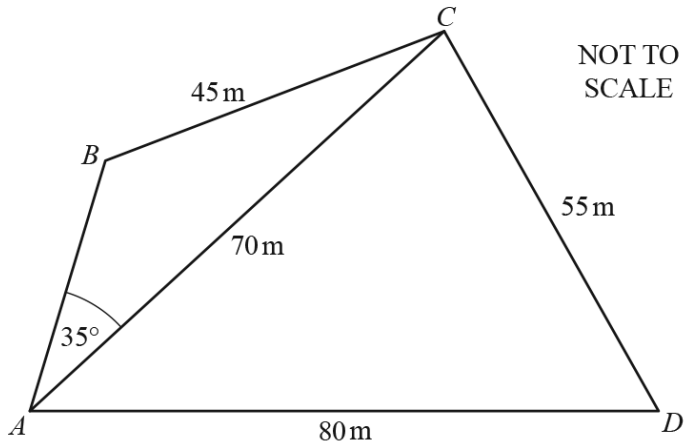
[3]

**(c)** $AX = 22$ cm.

Calculate the length of $BX$.

$BX =$ ..... cm [3]

28. 0607_s15_qp_42 Q: 11




The diagram shows the plan of a field *ABCD* with a path from *A* to *C*.

**(a)** Calculate

**(i)** the obtuse angle *ABC*,

*Answer(a)*(i) ..... [4]

**(ii)** angle *CAD*.

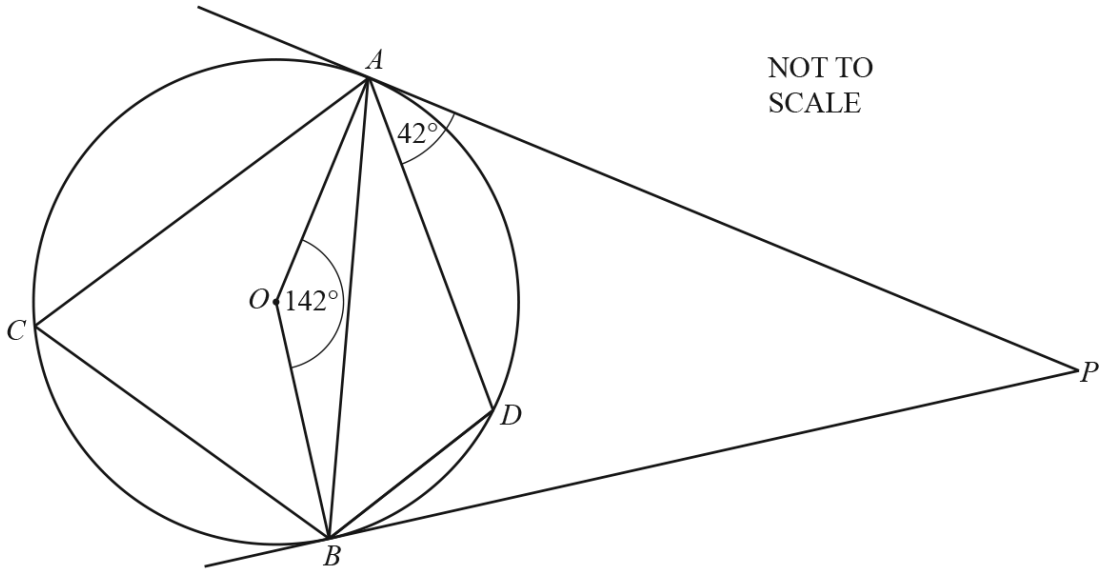


*Answer(a)*(ii) ..... [4]

**(b)** Waqar walks along the path *AC*.
Calculate his shortest distance from *B*.

*Answer(b)* ..... m [2]

29. 0607_s21_qp_41 Q: 10




$A$, $D$, $B$ and $C$ lie on a circle, centre $O$.
$AP$ is a tangent to the circle at $A$ and $BP$ is a tangent to the circle at $B$.
Angle $AOB = 142°$ and angle $DAP = 42°$.

**(a)** Find the value of

**(i)** angle $ABD$,

Angle $ABD =$ ..... [1]

**(ii)** angle $ACB$,

Angle $ACB =$ ..... [1]

**(iii)** angle $ADB$,

Angle $ADB =$ ..... [1]

**(iv)** angle $BAD$,

Angle $BAD =$ ..... [1]

**(v)** angle $APB$.

Angle $APB =$ ..... [1]

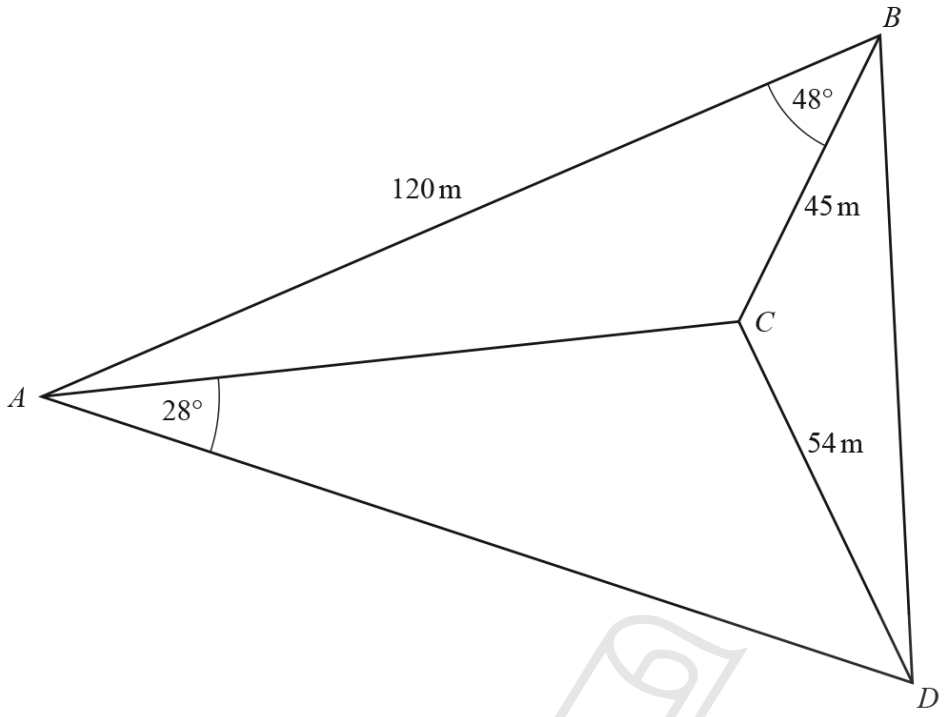
**(b)** The radius of the circle is 11 cm.

Find the area of triangle $ABD$.



..... $cm^2$ [5]

30. 0607_w21_qp_43 Q: 11




Angles $ACB$ and $ACD$ are obtuse.

**(a)** Show that $AC = 95.9$ m correct to the nearest 0.1 metre.



[3]

**(b)** Find angle $ACD$.

Angle $ACD$ = ..... [4]

**(c)** The area of triangle $ABD$ is $5137\,\text{m}^2$.

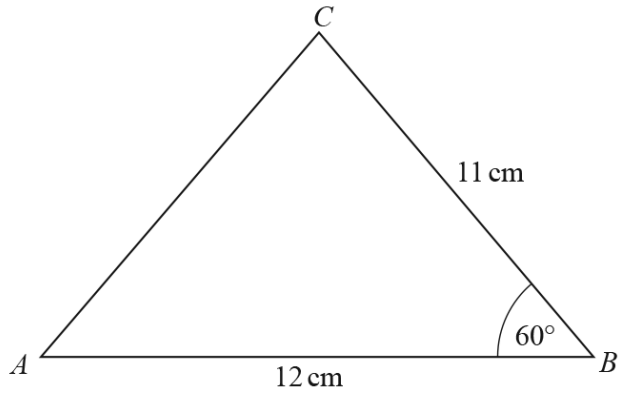
Calculate the area of triangle $BCD$.



..... $\text{m}^2$ [4]

31. 0607_s20_qp_41 Q: 11

**(a)**



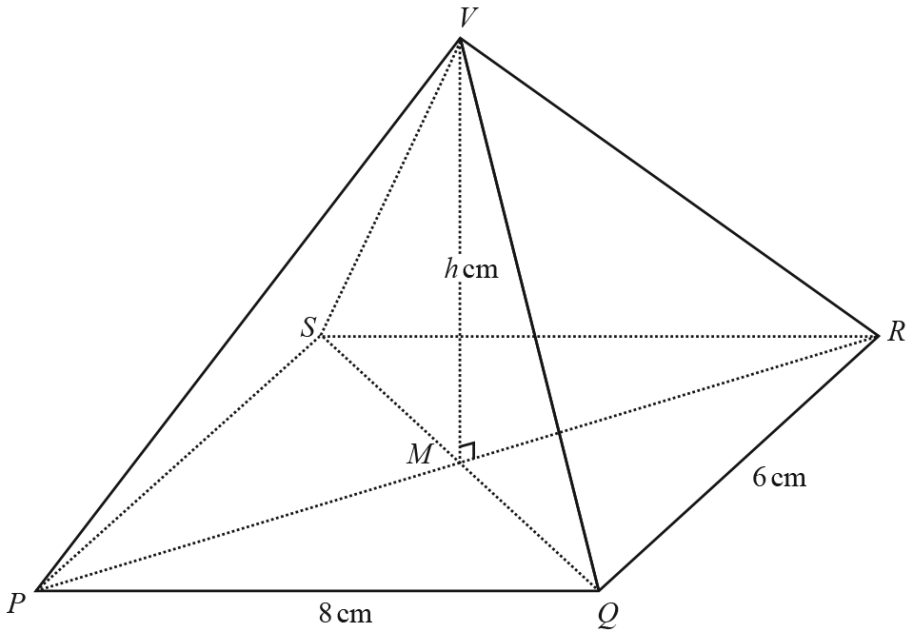

NOT TO SCALE

Calculate the shortest distance from $B$ to $AC$.



..... cm [7]

**(b)**




The diagram shows a pyramid on a rectangular base $PQRS$.
The diagonals of the base meet at $M$ and $V$ is vertically above $M$.

$PQ = 8$ cm, $QR = 6$ cm and $VM = h$ cm.
The volume of the pyramid is 112 $cm^3$.

**(i)** Show that $h = 7$.

[2]

**(ii)** Calculate the length of $VR$.



$VR =$ ..... cm [3]

**(iii)** $K$ is the mid-point of $PS$ and $L$ is the mid-point of $QR$.

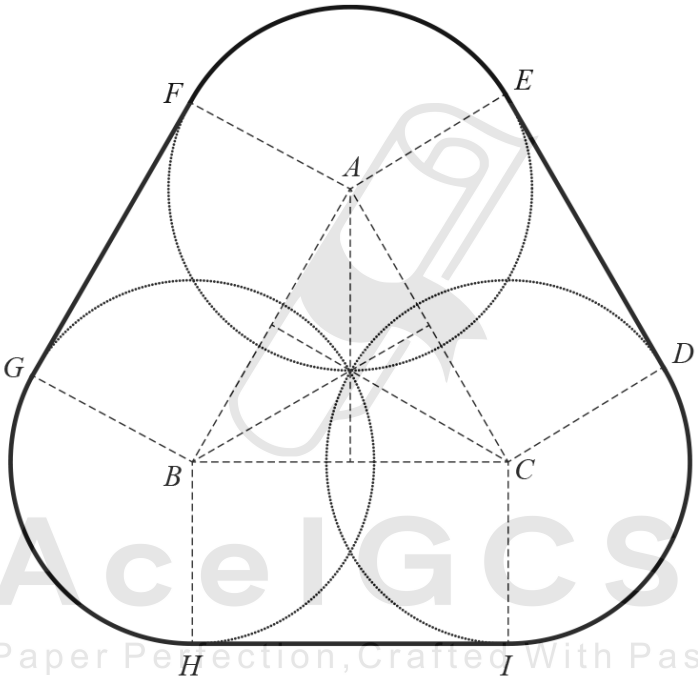
Calculate angle $KVL$.

Angle $KVL =$ ..... [3]

32. 0607_s20_qp_43 Q: 7

The diagram shows a radio in the shape of a prism.

This diagram shows the base of the radio.






$ABC$ is an equilateral triangle.
The circles have their centres at $A$, $B$ and $C$ and each has a radius of 5 cm.
$DE$, $FG$ and $HI$ are tangents to the circles.

**(a)** Show that $AB = 8.66$ cm, correct to 3 significant figures.

[3]

**(b)** Calculate the area of the base of the radio.

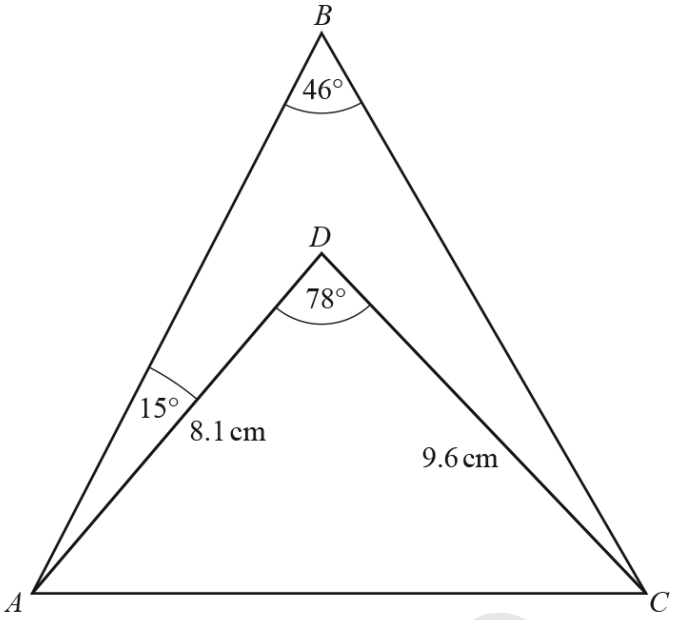
..... $cm^2$ [4]

**(c)** The height of the radio is 12 cm.

Calculate the volume of the radio.

..... $cm^3$ [1]

33. 0607_w20_qp_41 Q: 10




NOT TO SCALE

$ABC$ and $ADC$ are triangles.
$AD = 8.1$ cm and $CD = 9.6$ cm.
Angle $ABC = 46°$, angle $ADC = 78°$ and angle $BAD = 15°$.

**(a)** Find $AC$.



$AC =$ .....cm [3]

**(b)** Show that angle $DAC = 57°$, correct to the nearest degree.

[3]

**(c)** Find $BC$.

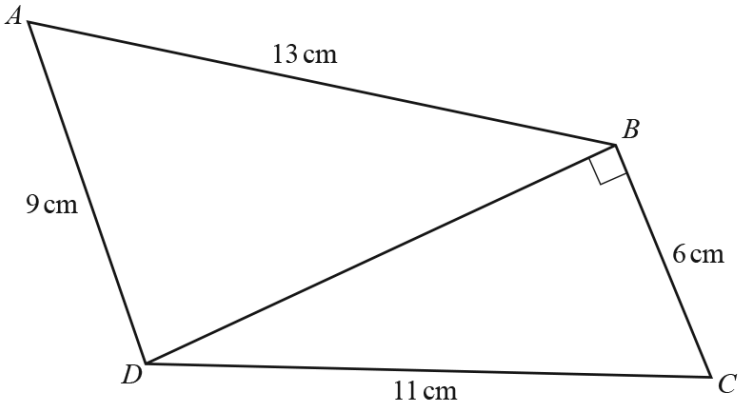
$BC =$ .....cm [3]

**(d)** Find the area of quadrilateral $ABCD$.



..... $cm^2$ [4]

34. 0607_s19_qp_41 Q: 8




NOT TO SCALE

*ABCD* is a quadrilateral.

**(a)** Show that $BD = 9.22$ cm, correct to 3 significant figures.

[3]

**(b)** Calculate angle *ABD*.



Angle *ABD* = ..... [3]

**(c)** Calculate the total area of the quadrilateral *ABCD*.

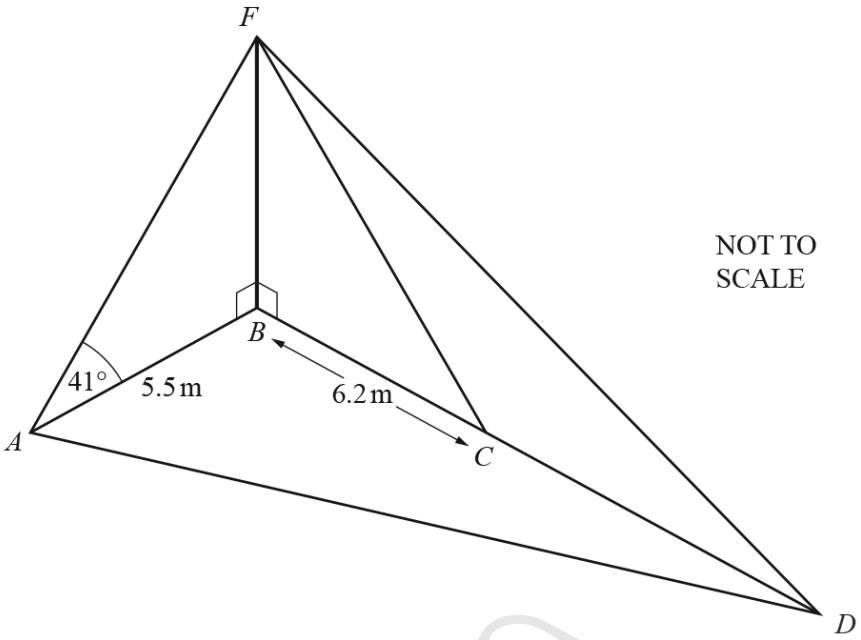
.....$cm^2$ [3]

**(d)** Calculate the length of the diagonal $AC$.

$AC =$ ..... cm [3]

---

35. 0607_s19_qp_43 Q: 11




The diagram shows four points *A, B*, *C* and *D* on horizontal ground.
There is a vertical flagpole, *FB,* held in place by straight wires *AF*, *CF* and *DF*.
*BCD* is a straight line, $AB = 5.5\,\text{m}$, $BC = 6.2\,\text{m}$ and angle $FAB = 41°$.

**(a)** Show that $FB = 4.781\,\text{m}$, correct to 3 decimal places.

[2]

**(b)** Calculate angle *FCB*.

Angle *FCB* = ..... [2]

**(c)** Angle $CDF = 18°$.

Show that $CD = 8.514$, correct to 3 decimal places.

[3]

**(d)** Angle $ABC = 78°$.

Find $AD$.

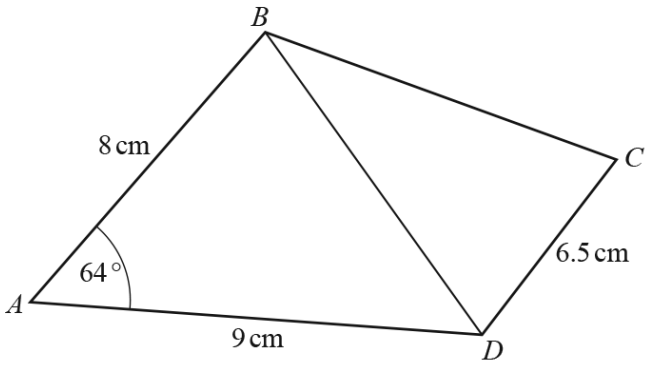


$AD =$ ..... m [3]

**(e)** Find the area of triangle $ABD$.

..... $m^2$ [2]

36. 0607_w19_qp_42 Q: 11




NOT TO SCALE

The diagram shows a quadrilateral $ABCD$.
$AB = 8$ cm, $AD = 9$ cm, $CD = 6.5$ cm and angle $BAD = 64°$.

**(a)** Calculate $BD$ and show that your answer rounds to 9.05 cm, correct to 2 decimal places.

[2]

**(b)** The area of the quadrilateral $ABCD$ is 57.3 $cm^2$.

**(i)** Calculate angle $BDC$ and show that your answer rounds to 58°, correct to the nearest degree.

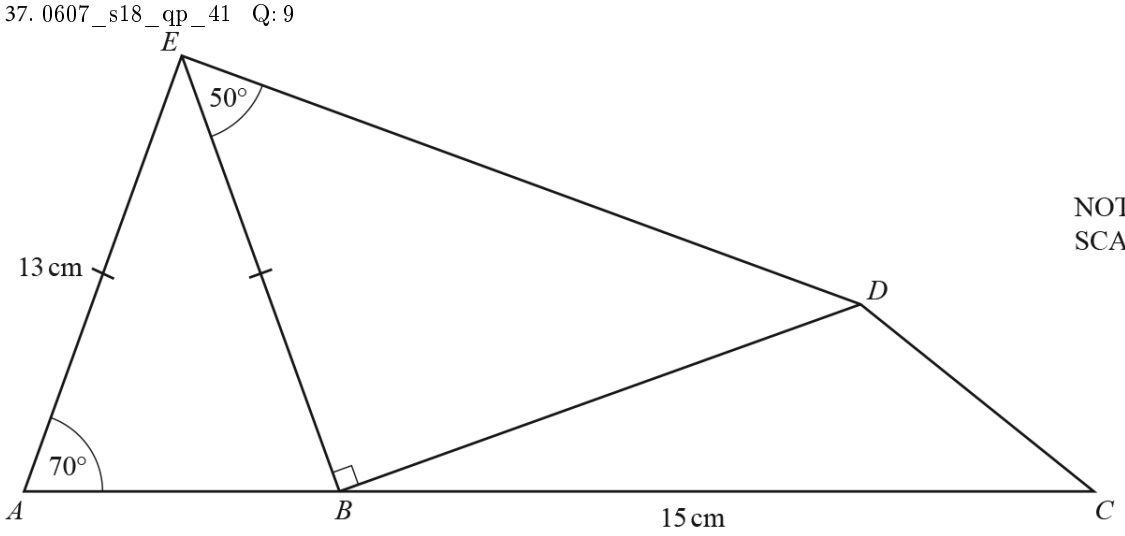


[4]

**(ii)** Calculate angle $BCD$.

angle $BCD$ = ..... [5]

37. 0607_s18_qp_41 Q: 9




NOT TO SCALE

In the diagram, $ABC$ is a straight line, $AE = BE = 13$ cm and $BC = 15$ cm.
Angle $EAB = 70°$, angle $EBD = 90°$ and angle $BED = 50°$.

Calculate

**(a)** the length of the perpendicular line from $E$ to $AB$,



..... cm [2]

**(b)** the length $BD$,

$BD =$ ..... cm [2]

**(c)** the length $CD$,

$CD =$ ..... cm [4]

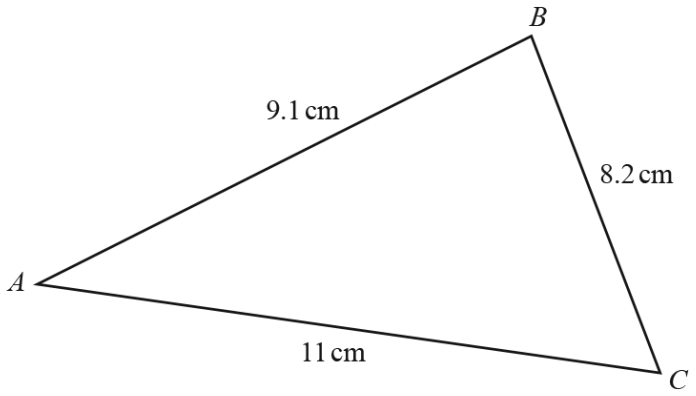
**(d)** the area of the quadrilateral $ACDE$.



..... $cm^2$ [3]

---

38. 0607_s18_qp_42 Q: 9




NOT TO SCALE

**(a)** Show that angle $BAC = 47.0°$, correct to 1 decimal place.

[3]

**(b)** Use the sine rule to find angle $ABC$.



Angle $ABC$ = ..... [3]

**(c)** Find the area of triangle $ABC$.

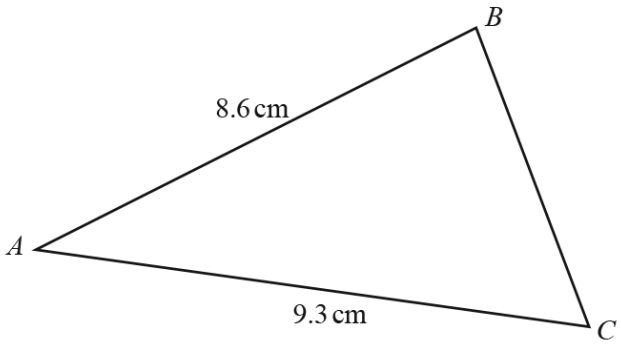
..... $cm^2$ [2]

**(d)** Find the length of the perpendicular from $B$ to $AC$.



..... cm [2]

39. 0607_w18_qp_41 Q: 11




NOT TO SCALE

The area of triangle $ABC = 23.5\,\text{cm}^2$.

**(a)** Show that angle $BAC = 36.0°$, correct to 1 decimal place.

[2]

**(b)** Use the cosine rule to find $BC$.

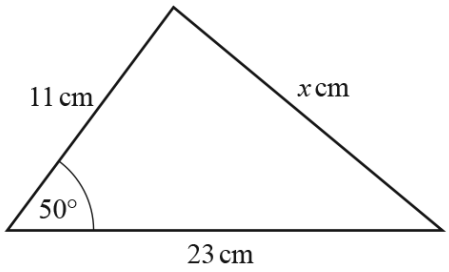
$BC =$ ..... cm [3]

**(c)** All the angles in triangle $ABC$ are acute.

Use the sine rule to find the largest angle in the triangle $ABC$.

..... [3]

40. 0607_w18_qp_43 Q: 6




NOT TO SCALE

Calculate

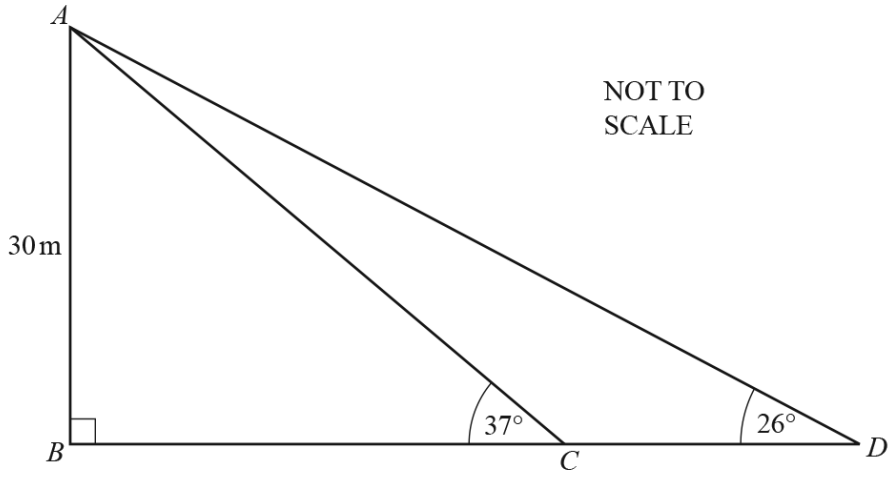
**(a)** the area of the triangle,

..... $cm^2$ [2]

**(b)** the value of $x$.

$x =$ ..... [3]

41. 0607_s17_qp_41 Q: 3




In the diagram, *BCD* is a straight line.

**(a)** Find *AC*.

*AC* = ..... m [3]

**(b)** Find *BC*.

*BC* = ..... m [3]

**(c)** Find $CD$.

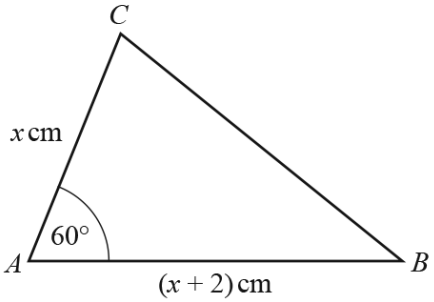
$CD =$ ..... m [3]

**(d)** Find the area of triangle $ACD$.



.....$m^2$ [2]

42. 0607_s17_qp_42 Q: 9




NOT TO SCALE

In the diagram $AC = x$ cm, $AB = (x + 2)$ cm and angle $A = 60°$.

**(a) (i)** Find an expression, in terms of $x$, for the area of triangle $ABC$.
Give your answer in surd form.

..... $cm^2$ [2]

**(ii)** The area of triangle $ABC = 18\sqrt{3}$ $cm^2$.

Show that $x^2 + 2x - 72 = 0$.

[2]

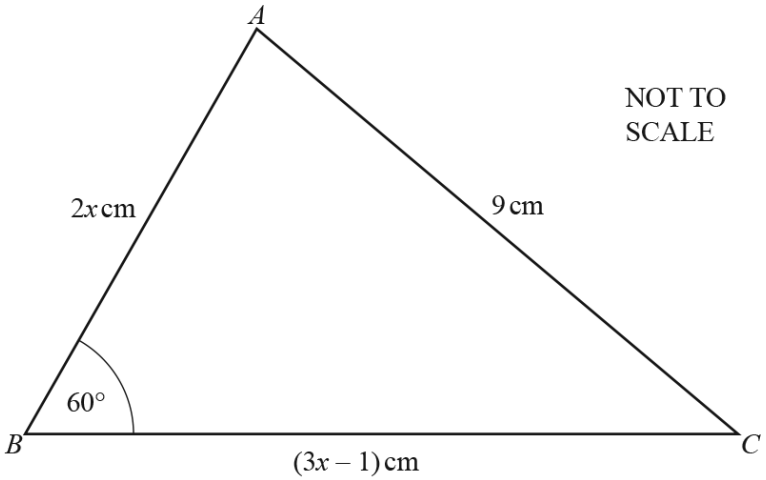
**(b) (i)** Solve the equation $x^2 + 2x - 72 = 0$.

$x =$ ..... or $x =$ ..... [2]

**(ii)** Find the shortest distance between the line $AB$ and the point $C$.

..... cm [2]

43. 0607_s16_qp_41 Q: 11




**(a)** Use the cosine rule to show that $7x^2 - 4x - 80 = 0$.



[4]

**(b)** **(i)** Solve the equation $7x^2 - 4x - 80 = 0$.
Show all your working.

$x =$ ..... or $x =$ ..... [3]

**(ii)** Find the length of $AB$ and the length of $BC$.

$AB =$ ..... cm

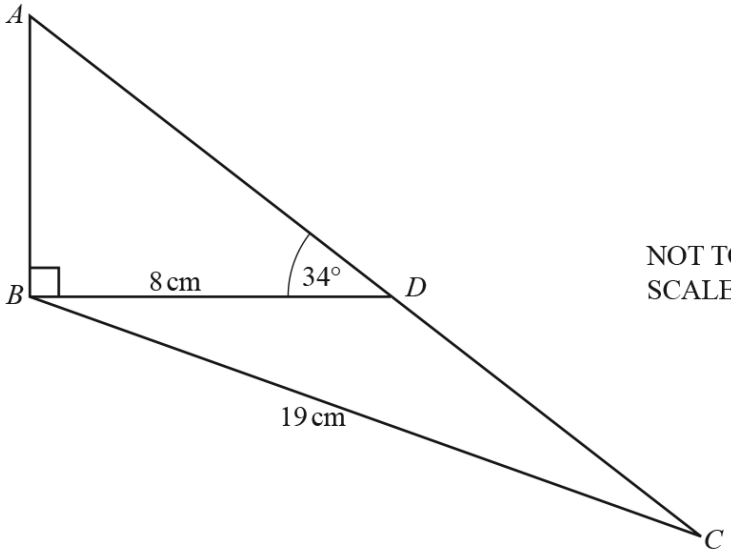
$BC =$ ..... cm [2]

**(c)** Find the area of triangle $ABC$.



..... $cm^2$ [2]

44. 0607_s16_qp_42 Q: 11




In the diagram, $ADC$ is a straight line.

**(a)** Calculate $AB$.

$AB =$ ..... cm [2]

**(b)** Calculate angle $DBC$.

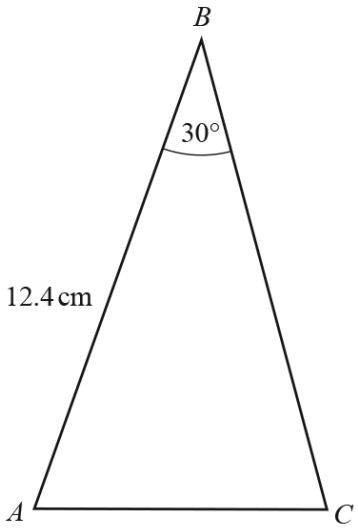


Angle $DBC =$ ..... [5]

**(c)** Calculate the area of triangle $ABC$.

..... $cm^2$ [2]

45. 0607_s16_qp_43 Q: 5




NOT TO SCALE

The area of triangle $ABC$ is $34.1\,cm^2$.
$AB = 12.4\,cm$ and angle $ABC = 30°$.

**(a)** Show that $BC = 11\,cm$.

[1]

**(b)** Find $AC$.

$AC =$ ..... cm [3]

**(c)** Find angle $CAB$.

Angle $CAB$ = ..... [3]

**(d)** Find the length of the perpendicular line from $A$ to the line $BC$.



..... cm [2]

---

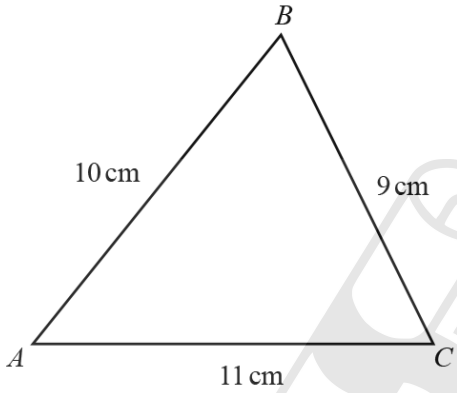
46. 0607_w16_qp_42 Q: 8

**(a)** $\cos x = \frac{1}{3}$ for $0° < x < 90°$.

Find the exact value of $\sin x$.
Give your answer as a surd.

$\sin x =$ ..... [3]

**(b)**




NOT TO SCALE

**(i)** Show that $\cos B = \frac{1}{3}$.



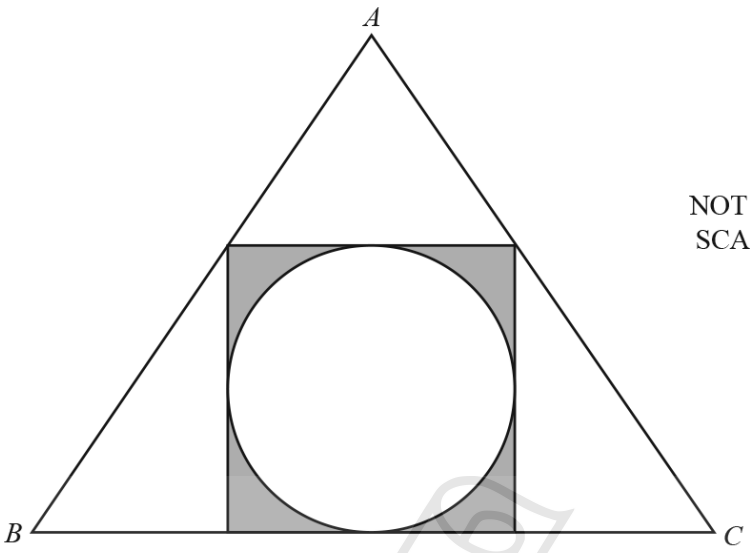
[2]

**(ii)** Using your answer to **part (a)**, show that the exact value of the area of triangle $ABC$ is $30\sqrt{2}$ cm$^2$.

[3]

47. 0607_w16_qp_42 Q: 9

A circle of radius 5 cm is inscribed inside a square.
The square has one side on the base of an equilateral triangle, *ABC*.
The other two vertices of the square touch the triangle as shown.

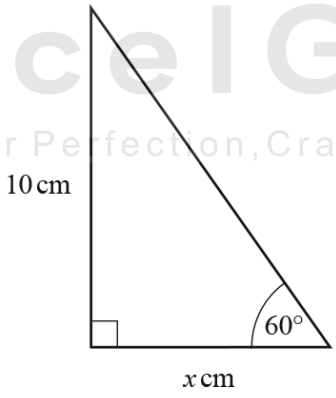



NOT TO SCALE

**(a)** Work out the shaded area.

.....cm$^2$ [2]

**(b)** **(i)**




NOT TO SCALE

Find the value of $x$.

$x$ = ..... [2]

**(ii)** Work out the length of a side of the equilateral triangle *ABC*.

..... cm [2]

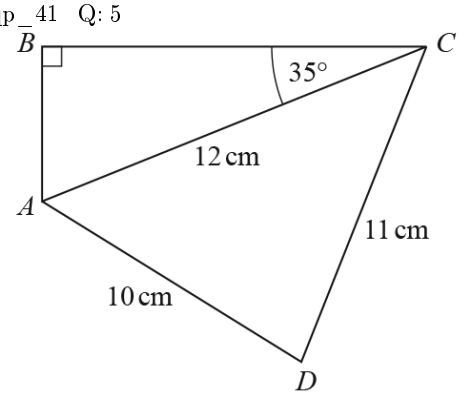
**(iii)** Calculate the area outside the square but inside triangle *ABC*.



..... $cm^2$ [4]

---

48. 0607_w15_qp_41 Q: 5




NOT TO SCALE

Calculate

**(a)** $BC$,

*Answer(a)* ..... cm [2]

**(b)** angle $CAD$,



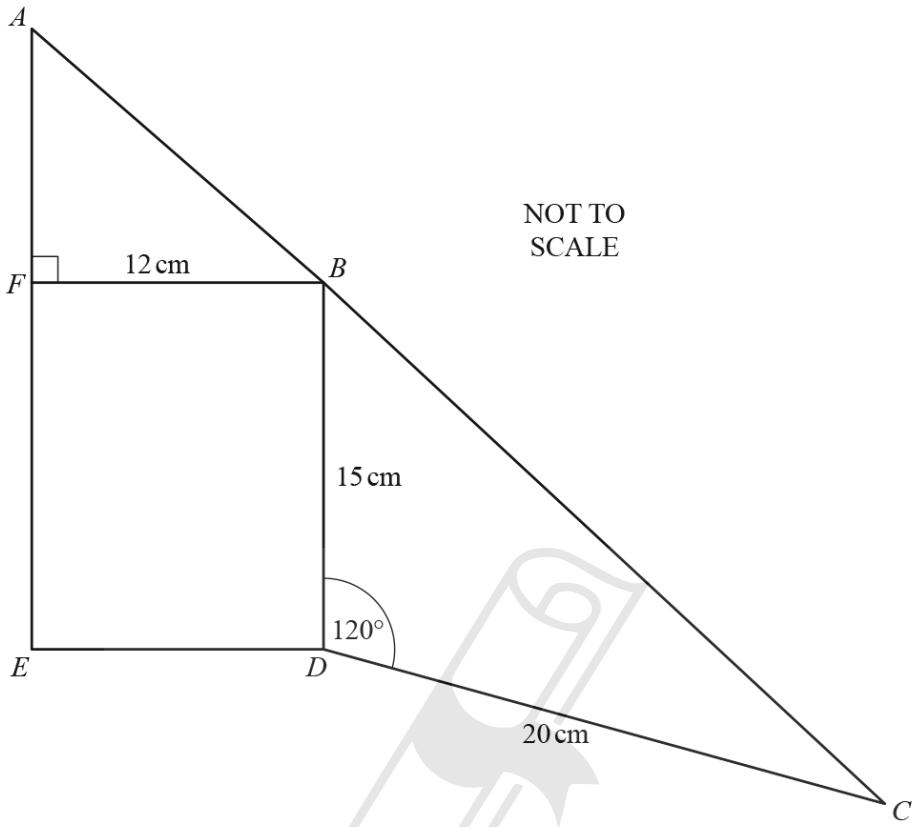
*Answer(b)* ..... [3]

**(c)** the area of the quadrilateral $ABCD$.

*Answer(c)* ..... $cm^2$ [3]

49. 0607_w15_qp_42 Q: 12

In the diagram, *ABC* is a straight line and *BFED* is a rectangle.




**(a)** Find *BC*.



*Answer(a)* ..... cm [3]

**(b)** Show that angle *DBC* = 34.7°, correct to 3 significant figures.

[3]

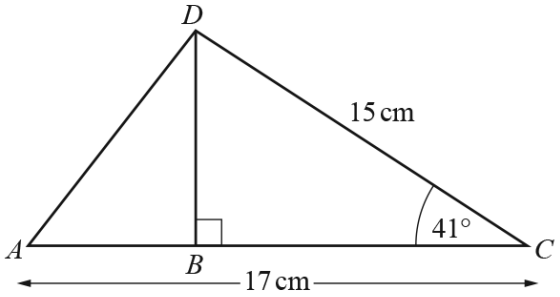
**(c)** Find the perimeter of the quadrilateral *ACDE*.

*Answer(c)* ..... cm [4]

**(d)** Find the area of the quadrilateral *ACDE*.

*Answer(d)* .....$cm^2$ [3]

50. 0607_w15_qp_43 Q: 1




NOT TO SCALE

**(a)** Calculate the length of *BD*.

*Answer(a)* ..... cm [2]

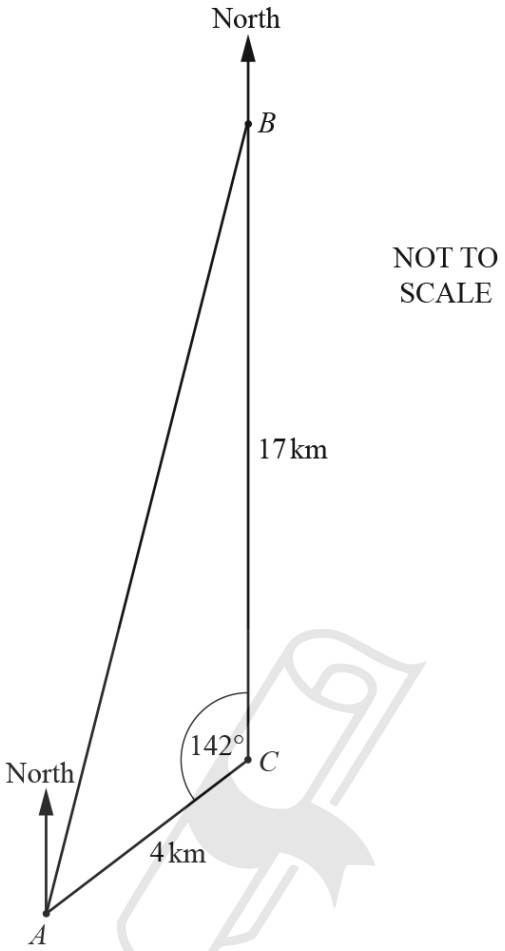
**(b)** Calculate the area of triangle *ACD*.

*Answer(b)* ..... $cm^2$ [2]

**(c)** Use the cosine rule to find the length of *AD*.

*Answer(c)* ..... cm [3]

51. 0607_m21_qp_42 Q: 8




Rani sails in a boat race around a triangular course.
She sails from $A$ to $B$ to $C$ and then directly back to $A$.
$B$ is due north of $C$.

**(a)** Find the bearing Rani sails on from $C$ to $A$.

..... [1]

**(b)** Show that $AB = 20.3$ km, correct to 1 decimal place.

[3]

**(c)** Calculate the bearing of $B$ from $A$.

..... [3]

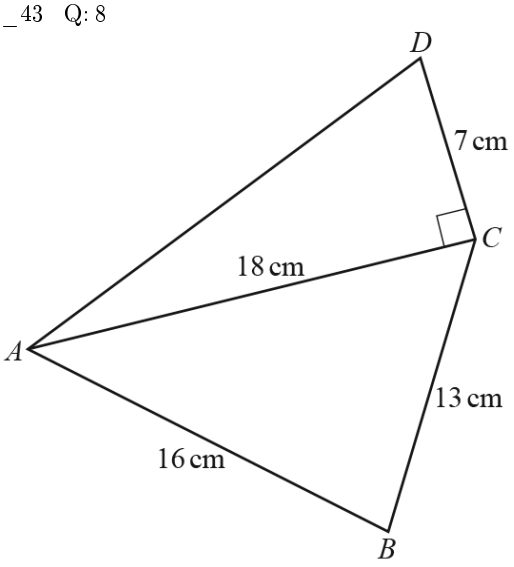
**(d)** Rani starts the race at 08 57 and returns to $A$ at 12 33.

Calculate the average speed of her boat in km/h.



..... km/h [3]

52. 0607_s21_qp_43 Q: 8




NOT TO SCALE

**(a)** Calculate angle *BCA* and show that it rounds to 59.57°, correct to 2 decimal places.

[3]

**(b)** Find the area of quadrilateral *ABCD*.

..... $cm^2$ [3]

**(c)** Find the shortest distance from $A$ to $BC$.

..... cm [2]

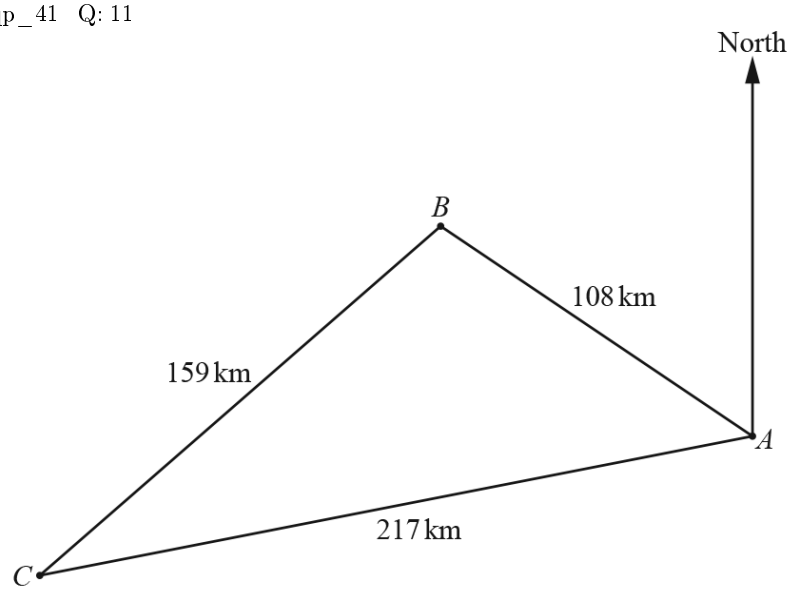
**(d)** $D$ is due north of $B$.

Find the bearing of $B$ from $C$.



..... [6]

53. 0607_w21_qp_41 Q: 11




NOT TO SCALE

$A$, $B$ and $C$ are three ports.

**(a)** Show that angle $ABC = 107.2°$ correct to 1 decimal place.

[3]

**(b)** The bearing of $B$ from $A$ is 305°.

**(i)** Using the sine rule, show that angle $BAC = 44.4°$ correct to 1 decimal place.

[3]

**(ii)** Find the bearing of $C$ from $A$.

..... [1]

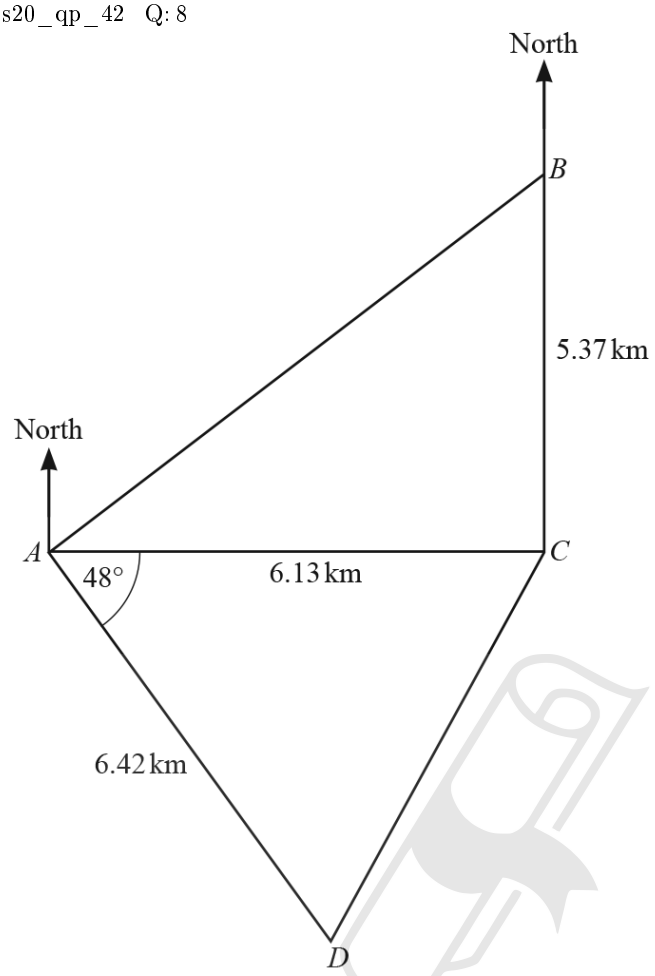
**(c)** A ship leaves $A$ at 22 50 and sails at a constant speed of 24 km/h towards $C$.

Calculate the time, correct to the nearest minute, when the ship is nearest to $B$.



..... [5]

54. 0607_s20_qp_42 Q: 8




NOT TO SCALE

The diagram shows four points $A$, $B$, $C$ and $D$ on horizontal ground.

$B$ is due North of $C$ and $C$ is due East of $A$.

**(a)** Find the bearing of

**(i)** $D$ from $A$,

..... [1]

**(ii)** $A$ from $D$.

..... [1]

**(b)** Calculate angle $ABC$.

Angle $ABC$ = ..... [2]

**(c)** Calculate the area of quadrilateral $ABCD$.

..... $km^2$ [3]

**(d)** Calculate $CD$.

$CD$ = ..... km [3]

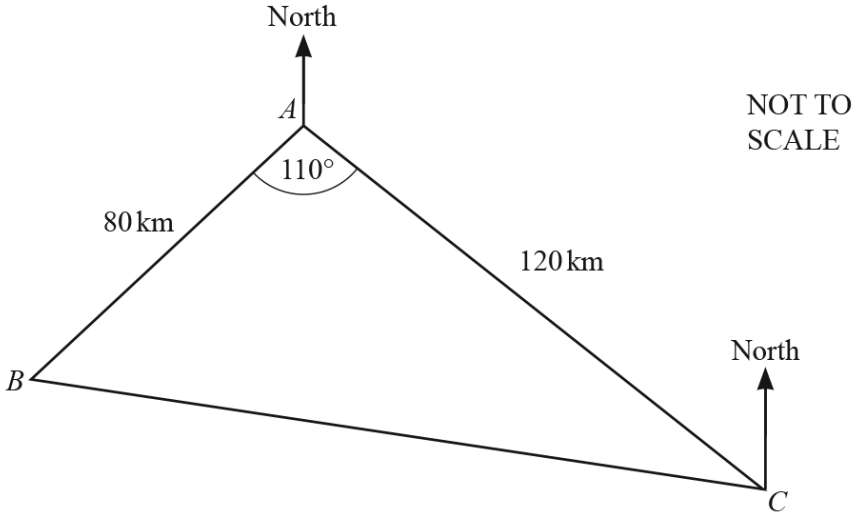
**(e)** Angle $ACD$ is acute.

Find the bearing of $D$ from $C$.



..... [4]

55. 0607_s20_qp_43 Q: 11




The diagram shows the positions of three ports, $A$, $B$ and $C$.

**(a)** Calculate $BC$.

$BC =$ ..... km [3]

**(b)** Use the sine rule to calculate angle $ABC$.

Angle $ABC =$ ..... [3]

**(c)** The bearing of $C$ from $A$ is 130°.

Find the bearing of $B$ from $C$.

..... [2]

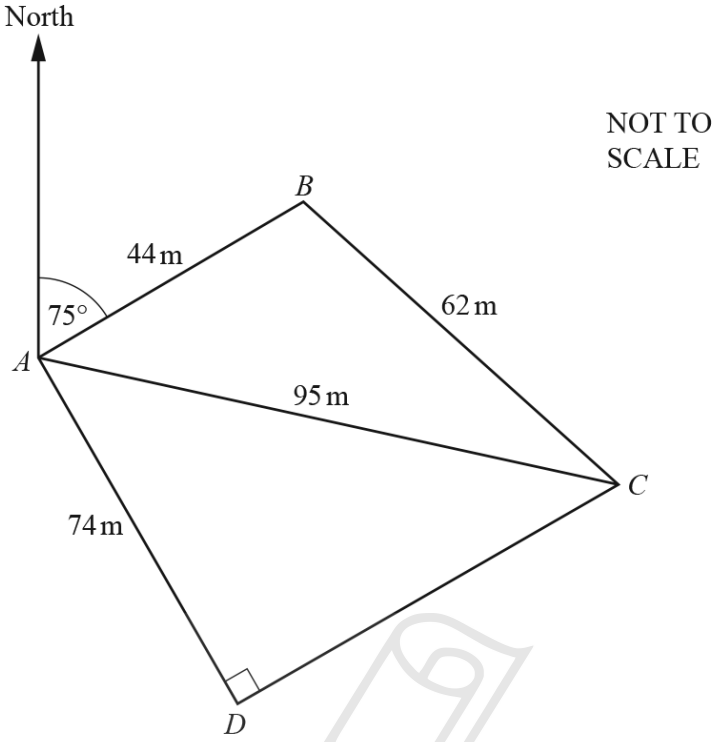
**(d)** A ship leaves $B$ at 13 50 and sails in a straight line towards $C$.
Its constant speed is 37 km/h.

Find the time when it is at its closest point to $A$.
Give your answer correct to the nearest minute.



..... [5]

56. 0607_w20_qp_42 Q: 6




The diagram shows a field $ABCD$ with a straight path from $A$ to $C$.
The bearing of $B$ from $A$ is 075° and angle $ADC = 90°$.

**(a)** Show that angle $BAC = 31.6°$, correct to 1 decimal place.



[3]

**(b)** Find the bearing of $D$ from $A$.

..... [3]

**(c)** Find the shortest distance from $B$ to $AC$.

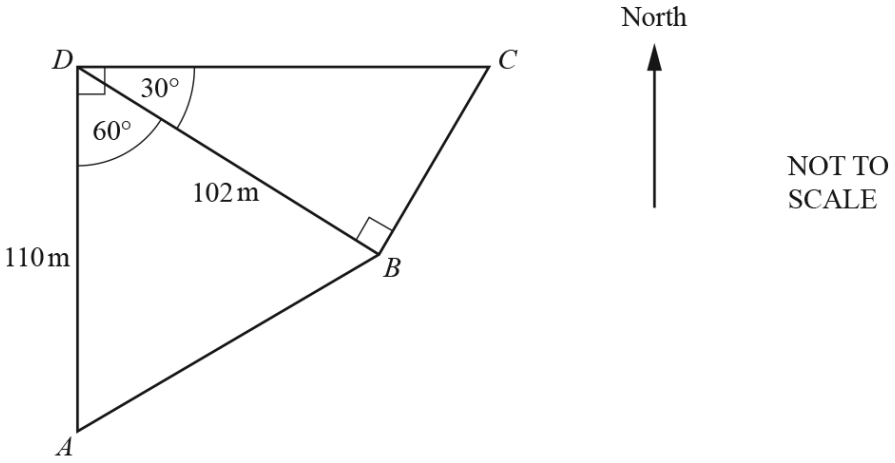
..... m [2]

**(d)** Find the total area of the field $ABCD$.



..... $m^2$ [3]

57. 0607_s19_qp_42 Q: 11




The diagram shows two fields on horizontal ground.
$A$ is due south of $D$ and $C$ is due east of $D$.

**(a)** Calculate $DC$.

$DC =$ ..... m [3]

**(b)** Calculate $AB$.

$AB =$ ..... m [3]

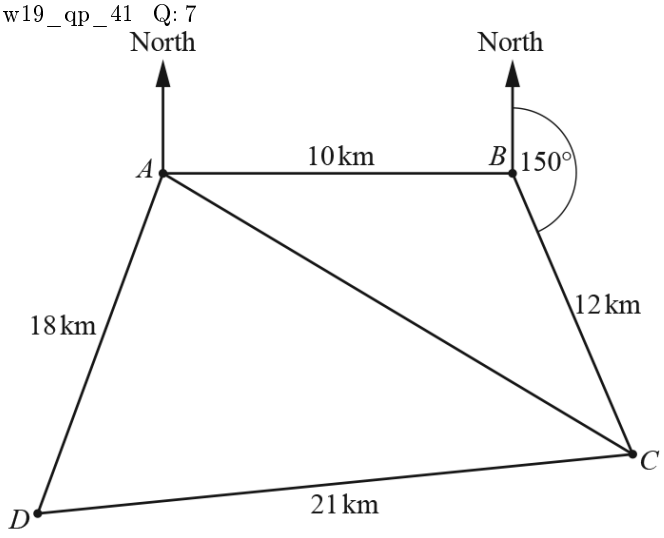
**(c)** Calculate the **total** area of the fields.

..... $m^2$ [3]

**(d)** Calculate the bearing of $A$ from $B$.

..... [4]

58. 0607_w19_qp_41 Q: 7




NOT TO SCALE

The diagram shows four villages $A$, $B$, $C$ and $D$ and five straight roads connecting them.
$B$ is 10 km due east of $A$.
$C$ is 12 km from $B$ on a bearing of 150°.
$D$ is 21 km from $C$ and 18 km from $A$.

**(a)** Calculate the distance $AC$ and show that your answer rounds to 19.08 km, correct to 2 decimal places.



[4]

**(b)** Using the sine rule, calculate angle $ACB$ and show that your answer rounds to 27.0°, correct to 1 decimal place.

[3]

**(c)** Calculate the bearing of $D$ from $C$.

..... [4]

**(d)** A straight path, $BP$, connects $B$ to the closest point, $P$, on $AC$.

Calculate the length of this path.

..... km [2]

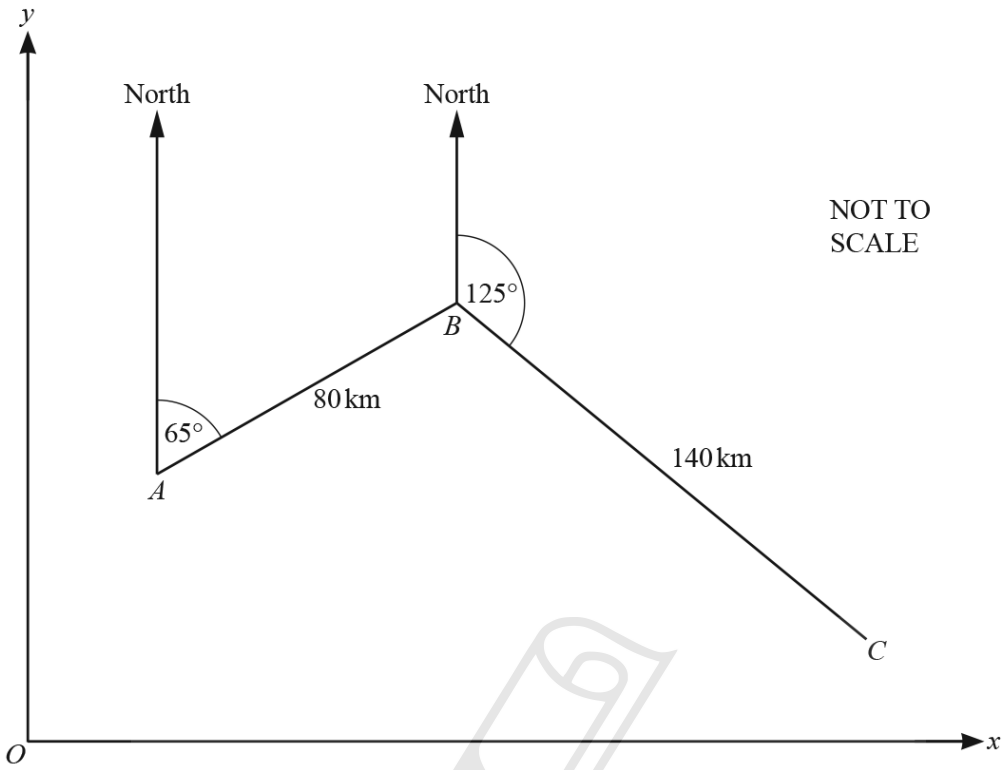
**(e)** The area within triangle $ABC$ is grassland.

Calculate the area of this grassland.



.....$km^2$ [2]

59. 0607_s18_qp_43 Q: 6




A ship sails 80 km on a bearing of 065° from $A$ to $B$.
It then sails 140 km on a bearing of 125° from $B$ to $C$.

**(a)** Find $\overrightarrow{AB}$ as a column vector with the components in kilometres.



( ) [4]

**(b)** Find $\overrightarrow{AC}$ as a column vector with the components in kilometres.

$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [5]

**(c)** The ship sails directly back from $C$ to $A$.

Using your answer to **part (b)**, calculate

**(i)** the distance the ship sails from $C$ to $A$,

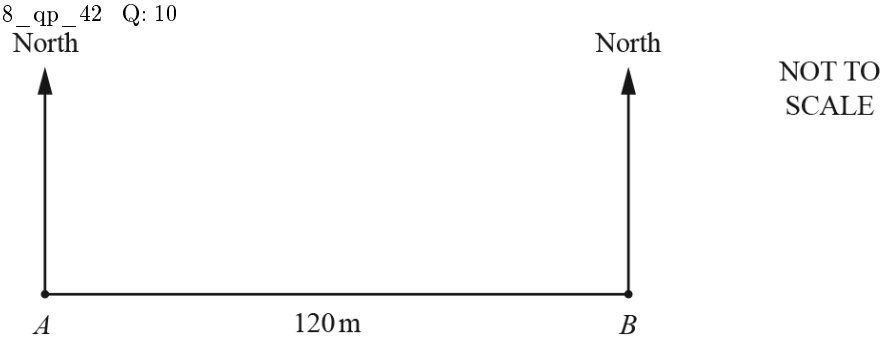
..... km [2]



**(ii)** the bearing of $A$ from $C$.

..... [3]

60. 0607_w18_qp_42 Q: 10




In the diagram, point $B$ is due east of point $A$.

**(a)** Point $C$ is on a bearing of 060° from $A$ and a bearing of 325° from $B$.

Calculate the distance $BC$.



$BC$ = ..... m [4]

**(b)** Point $D$ is South of $AB$.
$D$ is 80 m from $A$ and 90 m from $B$.

Calculate the bearing of $D$ from $B$.

..... [4]

61. 0607_s17_qp_42 Q: 7

A ship sails 65 km on a bearing of 310° from $A$ to $B$.
It then changes course and sails 40 km on a bearing of 250° from $B$ to $C$.
The ship then returns to $A$.

**(a)** On the diagram, sketch the path of the ship from $A$.
On your diagram show the bearings and distances.


[3]

**(b)** Find angle $ABC$.



..... [1]

**(c)** Calculate $AC$ and show that it rounds to 91.8 km, correct to the nearest tenth of a kilometre.

[3]

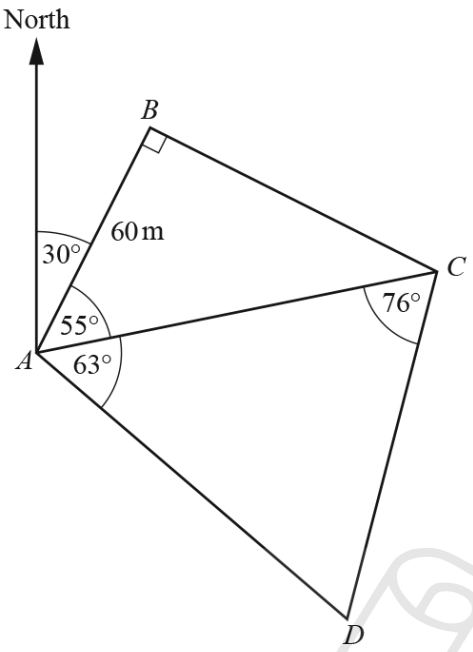
**(d)** Find the bearing of $C$ from $A$.

..... [4]

---

62. 0607_w17_qp_41 Q: 8

*ABC* and *ACD* are two triangular fields.




NOT TO SCALE

**(a)** Find the bearing of *B* from *C*.

..... [3]

**(b)** Calculate *AC* and show that it rounds to 104.6 m, correct to 1 decimal place.

[3]

**(c)** Calculate the total area of the two fields.

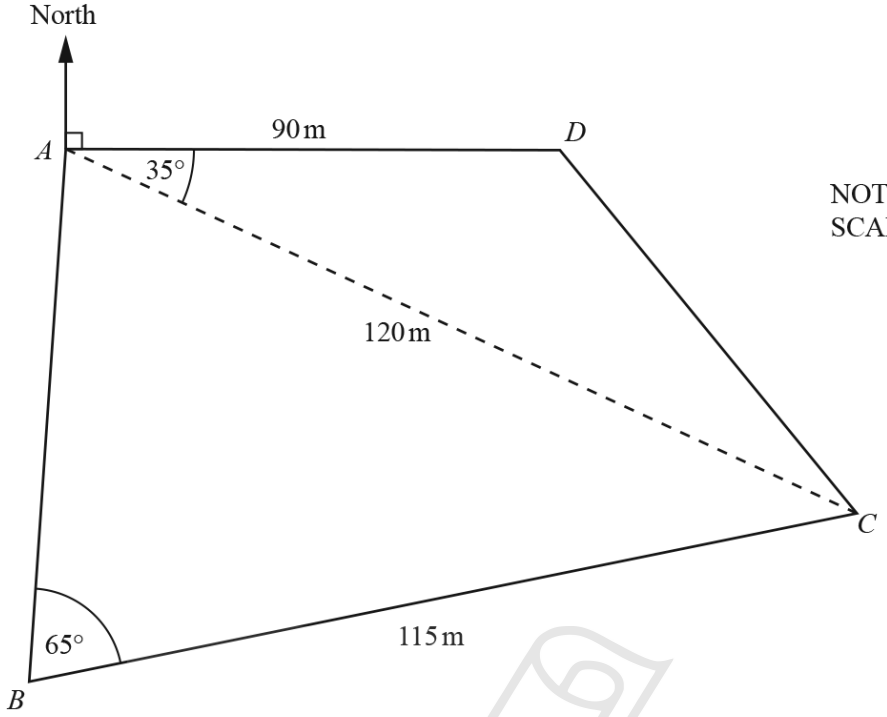
..... $m^2$ [6]

**(d)** Maria walks in a straight line from $D$ towards $A$.
She stops when she is at her closest point to $C$.

Calculate her distance from $C$.

..... m [2]

63. 0607_w17_qp_42 Q: 10




The diagram shows a school playing field, *ABCD*, which is on horizontal ground, with *D* due East of *A*.

**(a)** Find the bearing of

**(i)** *C* from *A*,

..... [1]

**(ii)** *A* from *C*.

..... [2]

**(b)** Calculate the length of *CD*.

*CD* = ..... m [3]

**(c)** Calculate angle $BAC$.

Angle $BAC$ = ..... [3]

**(d)** **(i)** Calculate the area of the school playing field.



..... $m^2$ [4]

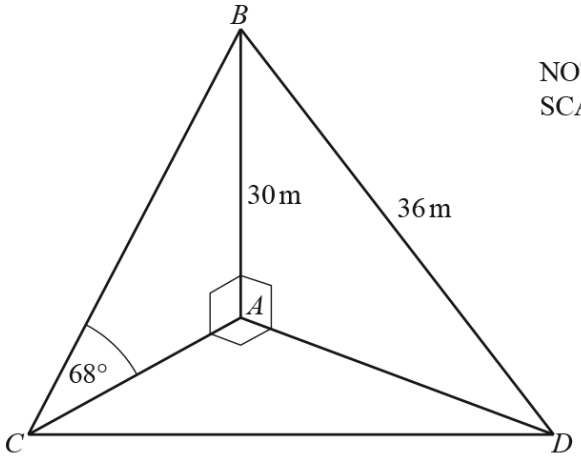


**(ii)** In the school office there is a plan of the school playing field.
It is drawn to a scale of 1 : 500.

Calculate the area of the school playing field on the plan.
Give your answer in $cm^2$.

..... $cm^2$ [3]

64. 0607_s16_qp_41 Q: 7




*AB* is a vertical tower of height 30 m.
*BC* and *BD* are straight wires attached to *B*.
*A*, *C* and *D* are on horizontal ground with *C* due west of *D*.
Angle *BCA* = 68° and *BD* = 36 m.

**(a)** Calculate *AD*.

*AD* = ..... m [3]

**(b)** Calculate *AC* and show that it rounds to 12.1 m, correct to 3 significant figures.



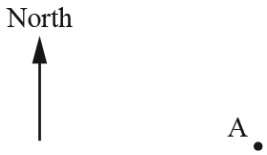
[3]

**(c)** Calculate the bearing of *A* from *D*.

..... [3]

65. 0607_w16_qp_42 Q: 2

Roberta starts from a point A and walks 1 km North to a point B.
She then walks 2 km East to a point C, then walks 3 km South to a point D and finally walks 4 km West to a point E.




**(a)** Find the distance *AE*.

..... km [3]

**(b)** Find the bearing of *E* from *A*.



..... [2]

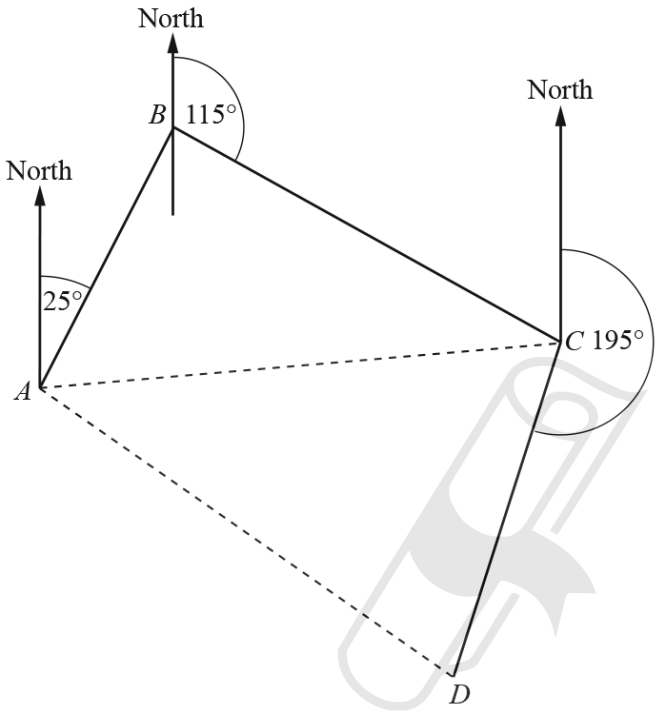
**(c)** Find the area *ABCDE*.

.....$km^2$ [2]

66. 0607_w16_qp_43 Q: 8
A ship sails on the following course.

- 60 km on a bearing of 025° from $A$ to $B$
- 80 km on a bearing of 115° from $B$ to $C$
- 75 km on a bearing of 195° from $C$ to $D$

The diagram shows the course.




NOT TO SCALE

**(a)** Show that angle $ABC = 90°$.



[1]

**(b)** Calculate angle $BCA$.

Angle $BCA$ = ..... [2]

**(c)** Calculate the distance $AC$.

$AC$ = ..... km [2]

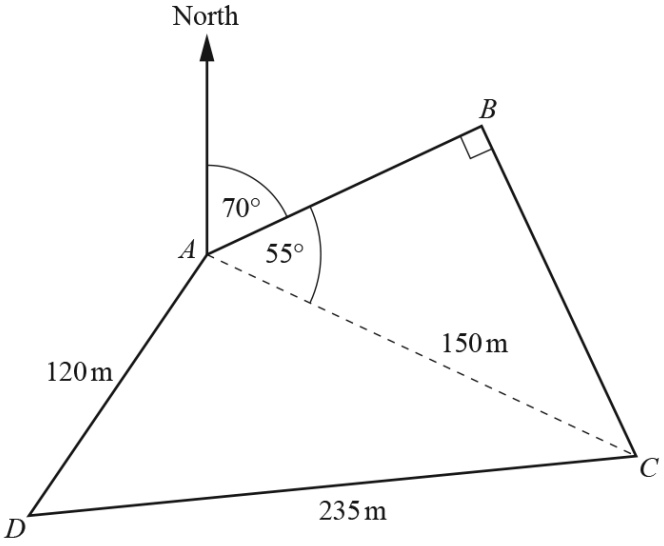
**(d)** Calculate the distance $AD$.

$AD =$ ..... km [4]

**(e)** Calculate the bearing of $D$ from $A$.

..... [4]

67. 0607_s15_qp_43 Q: 7




The diagram shows a field *ABCD* with a path from *A* to *C*.
*AC* = 150 m, *AD* = 120 m and *CD* = 235 m.
Angle *ABC* = 90°, angle *BAC* = 55° and the bearing of *B* from *A* is 070°.

**(a)** Calculate the length of *AB*.

*Answer(a)* ..... m [2]

**(b)** Calculate the bearing of *D* from *A*.



*Answer(b)* ..... [4]

**(c)** Calculate the area of the field *ABCD*.

*Answer(c)* ..... $m^2$ [3]

01. 0607_m24_ms_42 Q: 5

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 255 cao | **3** | **B2** for 75 correctly referenced at $C$ or $D$<br><br>OR<br><br>**B1** for angle $ACD = 47$<br>**B1** for angle $ACN$(orth) = 58<br>or $ACS$(outh) = 122 |
| (b) | $[\cos] = \frac{123^2 + 154^2 - 183^2}{2 \times 123 \times 154}$ | **M2** | **M1** for $183^2 = 123^2 + 154^2 - 2 \times 123 \times 154 \times \cos[\ldots]$ |
| | 81.87... | **A1** | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 15 200 or 15 150 to 15 161 | **5** | **M2** for $CD = \frac{183 \sin 27}{\sin 106}$<br>or **M1** for $\frac{CD}{\sin 27} = \frac{183}{\sin 106}$<br><br>OR<br><br>**M2** for $AD = \frac{183 \sin \textit{their} 47}{\sin 106}$<br>or **M1** for $\frac{AD}{\sin \textit{their} 47} = \frac{183}{\sin 106}$<br><br>AND<br>**M1** for $\frac{1}{2} \times 154 \times 123 \times \sin 81.9$<br>**M1** for $\frac{1}{2} \times 183 \times$ *their* $CD \times \sin$ *their*47<br>or $\frac{1}{2} \times 183 \times$ *their* $AD \times \sin 27$<br>or $\frac{1}{2} \times$ *their* $CD \times$ *their* $AD \times \sin 106$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[BC =]\sqrt{8^2 + 7^2 - 2\times 8\times 7\times \cos 73.4}$ | **M2** | or **M1** for $[BC^2] = 8^2 + 7^2 - 2\times 8\times 7\times \cos 73.4$<br>**M1** for 81.[00…] |
| | 9.00[0…] | **A1** | |
| (b) | $[\sin ...] = \frac{8\times \sin 73.4}{9}$ | **M2** | **M1** for $\frac{8}{\sin BCA} = \frac{9}{\sin 73.4}$ oe |
| | 58.4 or 58.41… | **B1** | |
| (c) | 26.8 or 26.83… | **2** | **M1** for $\frac{1}{2}\times 7\times 8\times \sin 73.4$ oe |
| (d) | 1.64 or 1.641 to 1.642 | **3** | **M1** for area sector $BCD = \pi\times 9\times 9\times \frac{36}{360}$<br>**M1** for area triangle $BCD = 0.5\times 9\times 9\times \sin 36$ |
| (e) | 29.7 or 29.65 to 29.66 NFWW | **2** | **M1** for $\frac{36}{360}\times 2\pi\times 9$ oe |

03. 0607_s24_ms_43 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[\cos B] = \frac{72^2+85^2-102^2}{2\times72\times85}$ | **M2** | **M1** for $102^2 = 72^2 + 85^2 - 2 \times 72 \times 85 \times \cos[B]$ |
| | 80.57... | **A1** | |
| (b) | 319.4 | **2** | **B1** for 40.6 or 139.4 |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 14 17 | **6** | **M2** for $\sin[A] = \frac{85\sin 80.6}{102}$<br>or $\cos[A] = \frac{72^2+102^2-85^2}{2\times72\times102}$<br>or **M1** for $\frac{85}{\sin A} = \frac{102}{\sin 80.6}$<br>or $85^2 = 72^2 + 102^2 - 2\times72\times102\cos A$<br><br>**M1** for [$AP$ =] 72 cos *their A* oe<br>**M1** for [time =] *their AP* ÷ 32<br>**M1** adding *their* time to 13 00<br><br>If 0 scored, **SC1** for showing $BP$ on diagram with right angle correctly placed on $AC$ |

04. 0607_m23_ms_42 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 40.7 or 40.69… | **3** | **M2** for $55^2 - 37^2$ oe soi by 1656<br>or **M1** for $55^2 = AB^2 + 37^2$ oe |
| (b) | 125.7 or 126 or 125.7… | **3** | **M2** for [sin $ACD$ =] $\frac{64\times\sin 28}{37}$<br>or **M1** for $\frac{64}{\sin ACD} = \frac{37}{\sin 28}$ oe |
| (c)(i) | 116 or 116.2 to 116.3 | **2** | **M1** for 180 – 28 – *their*(***b***) soi by 26.29 or 26.3 |
| (c)(ii) | 296 or 296.2 to 296.3 | **1** | **FT** 180 + *their* **(c)(i)** |
| (d) | 1280 or 1277 to 1278 | **3** | **M1** for 0.5 × *their*(**a**) × 37<br>**M1** for<br>0.5 × 64 × 37 × sin(180 – 28 – *their*(***b***)) |

05. 0607_m23_ms_42 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $\tan 63 = \frac{x}{BC}$ or $BC = \frac{x}{\tan 63}$ | B1 | |
| | $AB = 480 \times \frac{1000}{3600} \times 18$ oe | M1 | |
| | $AB = 2400$<br>$AC = \frac{x}{\tan 63} + 2400$ | A1 | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (b) | 1750 or 1750.[…] | 5 | **M4** for $\frac{2400 \tan 28}{\left(1 - \frac{\tan 28}{\tan 63}\right)}$ oe<br>or **M3** for<br>$x\frac{\tan 28}{\tan 63} + 2400 \tan 28 = x$ oe<br>or **M2** for $\tan 28 = \frac{x}{\left(\frac{x}{\tan 63} + 2400\right)}$ oe<br>or **M1** for $\tan 28 = \frac{x}{AC}$<br>OR<br>**M2** for $BD = \frac{2400 \sin 28}{\sin 35}$<br>or **M1** for $\frac{BD}{\sin 28} = \frac{2400}{\sin 35}$<br>**M2** for $x = theirBD \sin 63$<br>or **M1** for $\sin 63 = \frac{x}{theirBD}$ |



06. 0607_s23_ms_41 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 235 | 2 | **M1** for 180 + 55 or for 360 – 125 or for 270 – 35<br>or for 35 or 55 or 125 or 145 correctly indicated at $C$. |
| (b) | 55.1 or 55.06... | 2 | **M1** for $\frac{1}{2} \times 12 \times 16 \sin 35$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 40.4 or 40.41... | **4** | **M2** for $[\sin C =]\ \frac{5\sin 118}{12}$<br>or **M1** for $\frac{12}{\sin 118} = \frac{5}{\sin C}$ oe<br>**M1 dep** for 180 – 118 – *their C* dependent on sine rule used to find angle. |
| (d) | 15.5 or 15.51... nfww | **3** | **M2** for $\sqrt{5^2 + 16^2 - 2\times 5\times 16\cos(35 + theirA)}$<br>or **M1** for $5^2 + 16^2 - 2 \times 5 \times 16\cos(35 + theirA)$<br>**A1** for 241 or 240.6 to 240.7... |

07. 0607_s23_ms_42 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 40.2 or 40.17 to 40.19 | **5** | **B1** for 27<br>**M2** for $\sqrt{30^2 + (their\,27)^2 - 2\times 30\times (their\,27)\times \cos 140}$ oe<br>or **M1** for $30^2 + (their27)^2 - 2\times 30\times (their27)\times \cos 140$<br>**M1** for *their* 53.57 ÷ *their* time from *B* to *C* |
| (b) | [0]18.9 or [0]18.89 to [0]18.91 | **3** | **M2** for $\frac{their27\sin 140}{their53.57}$ oe<br>or **M1** for $\frac{\sin\theta}{their27} = \frac{\sin 140}{their53.57}$ |

08. 0607_s23_ms_43 Q: 5

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $\cos ACB = \frac{55^2 + 64^2 - 50^2}{2\times 55\times 64}$ | **M2** | **M1** for $50^2 = 55^2 + 64^2 - 2\times 55\times 64\times \cos ACB$ |
| | $[ACB =]\ 48.97...\ [= 49.0]$ | **A1** | |
| (b) | $\sin CAB = \frac{55\sin 49}{50}$ | **M2** | **M1** for $\frac{55}{\sin CAB} = \frac{50}{\sin 49}$ oe |
| | 56.1 or 56.07 to 56.12 | **B1** | |
| (c) | 1330 or 1327 to 1328… | **2** | **M1** for $0.5\times 64\times 55\times \sin 49$ oe |
| (d) | 331.9 to 333 | **2** | **FT** *their* **5(c)** ÷ 4<br>**M1** for $0.5^2$ or $2^2$<br>or $\frac{1}{2}\times 32\times 27.5\sin 49.0$ oe |

09. 0607_s23_ms_43 Q: 12

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| | 61.5 or 61.46…. | 6 | **B1** for $AB$ or $BC = 10$<br>**M2** for $CD = \frac{their\ BC}{\sin 30}$ oe<br>or **M1** for $\sin 30 = \frac{their\ BC}{CD}$ oe<br><br>**M2** for $BD = \frac{their\ BC}{\tan 30}$ oe<br>or **M1** for $\tan 30 = \frac{their\ BC}{BD}$ oe |

10. 0607_w23_ms_42 Q: 7

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $\cos ABD = \frac{7^2 + 5^2 - 7.63^2}{2 \times 7 \times 5}$ | **M2** | **M1** for $7.63^2 = 7^2 + 5^2 - 2 \times 7 \times 5 \times \cos ABD$ |
| | $ABD = 76.96...$ | **A1** | no errors or omissions |
| (b) | 17.1 or 17.[0] or 17.04 to 17.05… | **2** | **M1** for $0.5 \times 5 \times 7 \times \sin 77$ |
| (c) | 1.61 or 1.605 to 1.606… | **4** | **M3** for $\frac{7 \sin 12}{\sin (77 - 12)}$ oe<br>or **M2** for $\frac{BC}{\sin 12} = \frac{7}{\sin(77 - 12)}$<br>or **B1** for $[ACD =]65°$ |

11. 0607_s21_ms_41 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 106 or 106.4 to 106.5 | **3** | **M2** for $\sqrt{32^2 + 12^2}$ and $\sqrt{20^2 + 20^2}$ oe<br>or **M1** for $32^2 + 12^2$ or $20^2 + 20^2$ oe |
| (b)(i) | 632 | **3** | **M2** for $0.5 \times 20 \times 20$ and $0.5 \times 32 \times 12$ and $20 \times 12$ oe<br>or **M1** for $0.5 \times 20 \times 20$ or $0.5 \times 32 \times 12$ or $0.5 \times 12 \times 12$ or $0.5 \times 12 \times 12$ |
| (b)(ii) | 6 | **2** | **M1** for $\sqrt{\frac{their 632}{158}}$ or $\sqrt{\frac{158}{their 632}}$ |
| (c) | 69.4 or 69.42 to 69.45 | **2** | **M1** for $\tan[x] = \frac{32}{12}$ oe |

12. 0607_s21_ms_43 Q: 7

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 17 | **3** | **M2** for $x+5+8x+x+5=180$ oe<br>or **M1** for angle $A = x + 5$ |
| (b) | 10.1 or 10.10... | **4** | **B3** for correct sketch indicating roots<br>or for $\frac{-(-1)\pm\sqrt{(-1)^2-4(1)(-92)}}{2(1)}$ oe<br>or **B2** for $p^2-2p+p-2$ [=90] or better<br>or **M1** for $(p+1)(p-2)$ [=90] |
| (c) | 7 | **3** | **M2** for $2(y-4) = y-1$ or better<br>or **M1** for $\frac{y-4}{y-1} = \sin 30$<br><br>If 0 scored **SC1** for $\sin 30 = 0.5$ |
| (d) | 2.04 oe | **6** | **B4** for $(5w-1)(w+3)$<br>or correct sketch indicating roots<br>or $\frac{-14\pm\sqrt{14^2-4(5)(-3)}}{2(5)}$<br>or **B3** for $5w^2+14w-3=0$<br>and **M1** for correct calculation of area of triangle with *their* positive $w$<br><br>OR<br><br>**M1** for $(w+1)^2+(2w+3)^2=13$<br>**B1** for $w^2+w+w+1$ oe or $4w^2+6w+6w+9$ oe<br>and **M1** for correct calculation of area of triangle with *their* positive $w$ |

13. 0607_w21_ms_41 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 132 | 2 | **M1** for $\frac{1}{2}\times 6\times 4$ |
| (b) | 213 or 213.3... | 4 | **M1** for $6^2 + 4^2$<br>**M2** for $2 \times$ *their* $(\frac{1}{2}\times 6\times 4) + 6\times 11 + 4\times 11 +$ *their* $7.211 \times 11$<br>or **M1** for correct area of at least 3 faces |
| (c) | 13.2 or 13.15... | 3 | **M2** for $6^2 + 4^2 + 11^2$ oe<br>e.g. $11^2 +$ (*their DF*)$^2$<br>or **M1** for $6^2 + 4^2$ or $4^2 + 11^2$ or $6^2 + 11^2$ |
| (d) | 17.6 or 17.7 or 17.63... to 17.71 | 2 | **M1** for sin = $\frac{4}{theirAF}$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (e) | 479 to 480 | 3 | **M1** for $\sqrt[3]{\frac{445.5}{their(a)}}$ oe soi by 1.5 oe or $\frac{2}{3}$ oe<br>**M1** for (*their* $1.5)^2$ oe<br>or for $\left(\frac{445.5}{their(a)}\right)^2 = \left(\frac{area}{their(b)}\right)^3$ oe |

14. 0607_w20_ms_41 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 21.5 or 21.54… | 2 | **M1** for $20^2 + 8^2$ |
| (b) | 8.94 or 8.944… | 2 | **M1** for $12^2 - 8^2$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 48.2 or 48.15 to 48.19... | 2 | **M1** for $\cos[x] = \frac{8}{12}$ oe |
| (d) | 22.5 or 22.6 or 22.54 to 22.59 | 2 | **M1** for $\tan[x] = \frac{\sqrt{12^2 - 8^2}}{\sqrt{20^2 + 8^2}}$ oe<br>or $\tan[x] = \frac{their(b)}{their(a)}$ oe |

15. 0607_s18_ms_42 Q: 5

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 20 | **2** | **M1** for $16^2 + (30-18)^2$ |
| (b) | 36.9 or 36.86 to 36.87 | **2** | **M1** for $\tan[\ ] = \frac{18}{24}$ oe |
| (c) | 100 | **3** | **M2** for $2 \times (\textit{their}\ \textbf{(a)} + \sqrt{18^2 + 24^2})$ oe<br>or **M1** for $18^2 + 24^2$ or $RS = 30$ or $PQ = 30$ seen |
| (d) | 576 | **3** | **M2** for<br>$(40 \times 30) - 2 \times (0.5 \times 18 \times 24) - 2 \times (0.5 \times 16 \times 12)$ oe<br>or **M1** for any correct and relevant area |
| (e) | Correct explanation | **2** | **B1** for partial explanation e.g. ratio of two sides the same, with names or numbers given. |

16. 0607_w17_ms_43 Q: 6

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 192 | **2** | **M1** for $\frac{1}{3}\times\left(\sqrt{72}\right)^2\times 8$ oe |
| | $cm^3$ | **1** | |
| (b) | 12 | **2** | **M1** for $(\sqrt{72})^2+(\sqrt{72})^2$ oe |
| (c) | 10 | **3** | **M2** for $8^2+(0.5\,their\,(b))^2$<br>or **M1** for [*PD* oe =] 0.5 × *their* (b) |
| (d) | 53.1 or 53.13 | **2** | **M1** for $\tan=\frac{8}{0.5\times their(b)}$ or $\sin=\frac{8}{their(c)}$<br>or $\cos=\frac{0.5\times their(b)}{their(c)}$ |
| (e)(i) | $\sqrt{82}$ or 9.06 or 9.055... | **3** | **M2** for $8^2+(0.5\times\sqrt{72})^2$ or<br>$(their\,(c))^2-(0.5\times\sqrt{72})^2$<br>or **M1** for $(0.5\times\sqrt{72})^2$ |
| (e)(ii) | 62.1 or 62[.0] or 62.00 to 62.10 | **2** | **M1** for $\tan=\frac{8}{0.5\times\sqrt{72}}$ oe |
| (f) | 4 cao | **3** | **M2** for $\sqrt[3]{\frac{24}{their\,(a)}}$ or $\sqrt[3]{\frac{their\,(a)}{24}}$<br>soi by 2 or $\frac{1}{2}$<br>or **M1** for $\frac{24}{their\,(a)}$ or $\frac{their\,(a)}{24}$<br>soi by 8 or $\frac{1}{8}$ |

17. 0607_s15_ms_42 Q: 6

| Qu. | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 150 | 2 | **M1** for $\sqrt{120^2+90^2}$ |
| (b) | $\tan^{-1}\frac{90}{120}$ oe | M1 | i.e. trig ratio for any appropriate angle |
| | 53.13… or 36.86 to 36.87 or 106.26 | A1 | or **M1** [cos =] $\frac{150^2+150^2-180^2}{2\times150\times150}$ **A1** 0.28 oe |
| | 73.739… | A1 | |
| (c) | 25 300 or 25 270 to 25 281 | 3 | **M2** for $\frac{73.74}{360}\times\pi\times150^2+2\times\frac{1}{2}\times120\times90$ oe<br>or<br>**M1** for $\frac{73.74}{360}\times\pi\times150^2$ or $2\times\frac{1}{2}\times120\times90$ oe |
| (d) | 6.74 to 6.75 or 7 | 3 | **M2** for *their* **(c)** × 8 × 2 ÷ 60 000 oe<br>or **M1** for *their* **(c)** × 8 × 2 ÷ figs 6<br>or *their* **(c)** × 8 ÷ 60 000 or *their* **(c)** × 2 ÷ 60 000 |

18. 0607_s20_ms_42 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| | 6.29 or 6.288 to 6.293 | 6 | **M5** for $\frac{12\times\tan20\times\tan50}{\tan50-\tan20}$<br>or **M4** for $BC=\frac{12\tan20}{\tan50-\tan20}$<br>or **M3** for $BC\tan50=(12+BC)\tan20$<br>or **M2** for $\tan20=\frac{DC}{12+BC}$ and $\tan50=\frac{DC}{BC}$<br>or **M1** for $\tan20=\frac{DC}{12+BC}$ or $\tan50=\frac{DC}{BC}$ |

19. 0607_w18_ms_43 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 60.3 or 60.25 to 60.26 | **2** | **M1** for tan = $\frac{7}{4}$ oe |
| (b) | 54.5 or 54.46… | **3** | **M2** for tan = $\frac{7}{\frac{1}{2}\sqrt{6^2+8^2}}$ oe<br>or **M1** for $6^2+8^2$ or $3^2+4^2$ oe |
| (c) | 8.6[0] or 8.602… | **2** | **M1** for $7^2+(their\ 5)^2$ oe |
| (d) | 69.6 or 69.58 to 69.59 | **2** | **M1** for cos = $\frac{3}{their\ PC}$ oe |
| (e) | 6.49 or 6.493… | **3** | **M2** for $\frac{6\sin(their\textbf{(d)})}{\sin 60}$ oe<br>or **M1** for $\frac{\sin 60}{6}=\frac{\sin(their\textbf{(d)})}{BX}$ |

20. 0607_m22_ms_42 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 6.22 or 6.222 to 6.223 | **3** | **M2** for $\frac{4}{\sin 40}$ oe<br>or **M1** for sin 40 = $\frac{4}{x}$ oe |
| (b)(i) | 49.5 or 49.45 to 49.46 | **3** | **M2** for [cos=] $\frac{9^2+10^2-8^2}{2.9.10}$ oe<br>or **M1** for $8^2 = 9^2 + 10^2 - 2 \times 9 \times 10 \cos(...)$ |
| (b)(ii) | 5.85 or 5.845 to 5.851... | **3** | **M2** for $\frac{BT}{9}=\cos(their\textbf{(b)(i)})$ oe or better<br>or **M1** for $CT$ drawn and right angle at $T$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 21[.0] or 20.98 to 21.00 | **5** | **M2** for $\frac{12\sin 35}{7}$<br>or **M1** for $\frac{7}{\sin 35}=\frac{12}{\sin P}$ oe<br>**A1** for 79.5 or 79.50 to 79.51<br>**M1** for 180 – *their* 79.5<br>If 0 scored, **SC1** for diagram showing the two angles |

21. 0607_s21_ms_42 Q: 5

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $20^2 + 10^2$ | **M1** | |
| | 22.360 to 22.361 | **A1** | |
| (b) | $\tan 35 = \frac{10}{AB}$ oe | **M1** | $\frac{\sin 35}{10} = \frac{\sin 55}{AB}$, i.e correct implicit |
| | 14.281... | **A1** | |
| (c) | 17.4 or 17.43... | **2** | **M1** for $\sin 35 = \frac{10}{AP}$ oe<br>or $14.28^2 + 10^2$ |
| (d) | 30.5 or 30.52... | **3** | **M1** for<br>$20^2 + 14.28^2 - 2\times 20\times 14.28\times \cos 125$<br>**A1** for 931.5 to 931.6... |
| (e) | 99.2 to 99.5 | **3** | **M2** for [cos = ]<br>$\frac{22.36^2 + (their\,17.4)^2 - (their\,30.5^2)}{2\times 22.36\times (their\,17.4)}$<br>or **M1** for<br>$(their\,30.5)^2 = 22.36^2 + (their\,17.4)^2$<br>$-2\times 22.36\times (their\,17.4)\times \cos APB$ |

22. 0607_w21_ms_42 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (b)(i) | *PA* and *CA* drawn and arc at *A* | **1** | |
| (b)(ii) | 12.9 or 12.85 to 12.86 | **4** | **M3** for $\sin[...=]\frac{5\sin 73.45}{\sqrt{20^2+8^2}}$<br>OR<br>**M1** for $\sqrt{20^2+8^2}$<br>**M1** for $\frac{their\ AC}{\sin 73.45} = \frac{5}{\sin PAC}$ oe |

23. 0607_w19_ms_43 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $14^2 + 12^2 - 2 \times 14 \times 12 \times \cos 58$ | **M1** | |
| | 12.725 to 12.726 | **A2** | or **A1** for 161.9... |
| (b) | Angle at centre = 2 × angle at circumference oe | **1** | |
| (c) | 7.49 or 7.5[0] or 7.51 or 7.487 to 7.506 | **3** | **M2** for $\frac{6.365}{\sin 58}$ oe<br>or **M1** for $\sin 58 = \frac{6.365}{OB}$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (d) | 31.3 to 31.9 nfww | **3** | **M2** for $\frac{116}{360} \times \pi \times (their\ \mathbf{(c)})^2$ $-\frac{1}{2} \times (their\ \mathbf{(c)})^2 \times \sin 116$ oe<br>or **M1** for $\frac{116}{360} \times \pi \times (their\ \mathbf{(c)})^2$ oe<br>or $\frac{1}{2} \times (their\ \mathbf{(c)})^2 \times \sin 116$ oe |

24. 0607_s17_ms_41 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[\cos x =] \frac{8^2 + 6^2 - 2^2}{2 \times 6 \times 8}$ oe | **M2** | **M1** for $12^2 = 8^2 + 6^2 - 2 \times 8 \times 6 \cos[...]$ |
| | 117.3 or 117.2 to 117.3 | **B1** | |
| (b) | $[\sin =] \frac{6 \times \sin(their(a))}{12}$ oe | **M2** | **M1** for $\frac{6}{\sin A} = \frac{12}{\sin(their(a))}$ oe |
| | 26.4 or 26.5 or 26.37 to 26.46 | **B1** | |

25. 0607_s17_ms_43 Q: 7

| Question | Answer | Marks | Part Marks |
|---|---|---|---|
| (a) | 9.77 or 9.766… | 3 | **M2** for $\frac{8}{\cos 35}$ oe<br>or **M1** for $\cos 35 = \frac{8}{AB}$ oe |
| (b) | 60.6 or 60.61… | 3 | **M2** for $\frac{6^2+9^2-8^2}{2\times 6\times 9}$<br>or **M1** for $8^2 = 6^2+9^2-2\times 6\times 9\cos C$ |

26. 0607_s16_ms_42 Q: 5

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | Any 2 of the following<br><br>Angle *ADX* = Angle *BCX* and same segment oe<br>Angle *DAX* = Angle *CBX* and same segment oe<br>Angle *AXD* = Angle *BXC* and vertically opp oe | **2** | **B1** for one of the three pairs or for at least two pairs of angles without reasons or with incorrect reasons |
| **(b)** | 7.5 oe | **2** | **M1** for $\frac{2}{3} = \frac{5}{BX}$ oe |
| **(c)** | 67.2 or 67.20 to 67.21 nfww | **3** | **M2** for [cos = ] $\frac{2^2+5^2-4.61^2}{2\times 2\times 5}$<br>or **M1** for<br>$4.61^2 = 2^2+5^2-2\times 2\times 5\cos(AXD)$ |

27. 0607_w16_ms_41 Q: 7

| Qu. | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | 42.[0] or 41.98 to 41.99 | **2** | **M1** for tan = $\frac{9}{10}$ oe |
| **(b)** | tan = $\frac{\sqrt{9^2+10^2}}{20}$ oe<br>33.91 to 33.93 | **M2**<br>**A1** | or **M1** for $\sqrt{9^2+10^2}$ or $\sqrt{9^2+10^2+20^2}$ |
| **(c)** | 12.4 or 12.39 to 12.40... nfww | **3** | **M1** for $20^2+22^2-2\times 20\times 22\cos 33.9$<br>**A1** for 153 to 154 |

28. 0607_s15_ms_42 Q: 11

| Qu. | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) (i) | 117 or 116.8 ... | 4 | **M2** for $\sin[\theta] = \frac{70\sin 35}{45}$ oe<br>or **M1** for $\frac{\sin[\theta]}{70} = \frac{\sin 35}{45}$ oe<br>**M1** for $180 - their\ \theta$ |
| (ii) | 42.4 or 42.36 to 42.37 | 4 | **M2** for $[\cos[\theta]] = \frac{70^2 + 80^2 - 55^2}{2 \times 70 \times 80}$<br>or **M1** for $55^2 = 70^2 + 80^2 - 2 \times 70 \times 80 \times \cos[\theta]$<br>**A1** for 0.739 or 0.7388 ... or $\frac{8275}{11200}$ or $\frac{1655}{2240}$ or $\frac{331}{448}$ |
| (b) | 21.1 to 21.3 | 2FT | **M1** for $45\sin(145 - their$ **(a)(i)**$)$ oe |

29. 0607_s21_ms_41 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a)(i) | 42 | 1 | |
| (a)(ii) | 71 | 1 | |
| (a)(iii) | 109 | 1 | **FT** $180 - their$(ii) |
| (a)(iv) | 29 | 1 | |
| (a)(v) | 38 | 1 | |
| **(b)** | 74.2 or 74.21 to 74.25... | 5 | **M1** for $[AB =] 2 \times 11 \cos 19$ oe<br>**M2** for $[AD =] \frac{their AB \times \sin(their 42)}{\sin(their 109)}$<br>or $[BD =] \frac{their AB \times \sin(their 29)}{\sin(their 109)}$<br>or **M1** for $\frac{AD}{\sin their 42} = \frac{their AB}{\sin their 109}$<br>or $\frac{BD}{\sin their 29} = \frac{their AB}{\sin their 109}$<br>and **M1** for [Area =] $0.5 \times their AB \times their AD \times \sin(their 29)$<br>or [Area =] $0.5 \times their AB \times their BD \times \sin(their 42)$<br>or [Area =] $0.5 \times their AD \times their BD \times sin(their 109)$ |

30. 0607_w21_ms_43 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[AC =]\sqrt{120^2 + 45^2 - 2\times45\times120\times\cos 48}$ | **M2** | **M1** for $[AC^2] = 120^2 + 45^2 - 2 \times 45 \times 120 \times \cos 48$ |
| | 95.90 to 95.91 | **A1** | |
| (b) | 95.5 or 95.50 to 95.51… | **4** | **M2** for $\sin ADC = \frac{95.9\times\sin 28}{54}$<br>or **M1** for $\frac{95.9}{\sin ADC} = \frac{54}{\sin 28}$ oe<br>**M1** for $180 - 28 - \textit{their } ADC$ |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 552 or 553 or 554 or 551.5 to 553.9 | **4** | **M3** for $5137 - 0.5 \times 120 \times 45 \times \sin 48 - 0.5 \times 95.9 \times 54 \times \sin(\textit{their } ACD)$<br>OR<br>**M1** for area $ABC = 0.5 \times 45 \times 120 \times \sin 48$<br>or **M1** for area $ABD = 0.5 \times 95.9 \times 54 \times \sin ACD$<br>OR<br>**M2** for $\sin ACB = \frac{120\times\sin 48}{95.9}$<br>or **M1** for $\frac{120}{\sin ACB} = \frac{95.9}{\sin 48}$<br>**M1** for area $BCD = 0.5 \times 45 \times 54 \times \sin(360 - \textit{their } \textbf{(b)} - \textit{their } ACB)$ |

31. 0607_s20_ms_41 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 9.91 or 9.912... | 7 | **B3** for $[AC=]\ \sqrt{133}$ or 11.5 or 11.53...<br>or **M1** for $11^2+12^2-2\times11\times12\times\cos60$<br>**A1** for 133<br><br>**B2** for area = 57.2 or 57.15 to 57.16<br>or **M1** for $\frac{1}{2}\times12\times11\times\sin60$<br><br>**M1** for $\frac{1}{2}\times\text{distance}\times\textit{their } AC=\textit{their Area}$<br><br>OR<br><br>**B3** for $[AC=]\ \sqrt{133}$ or 11.5 or 11.53...<br>or **M1** for $11^2+12^2-2\times11\times12\cos60$<br>**A1**for 133<br><br>**M2** for $\sin ACB=\frac{12\sin60}{\textit{their } AC}$ or for $\sin BAC=\frac{11\sin60}{\textit{their } AC}$<br>or **M1** for $\frac{12}{\sin ACB}=\frac{\textit{their } AC}{\sin60}$ or for $\frac{11}{\sin BAC}=\frac{\textit{their } AC}{\sin60}$<br><br>**M1** for $11\sin ACB$ or $12\sin BAC$ |
| (b)(i) | $\frac{112}{\frac{1}{3}\times8\times6}$ oe leading to 7 | **M2** | **M1** for $\frac{1}{3}\times8\times6\times h=112$ oe |
| (b)(ii) | 8.60 or 8.602... | **3** | **M2** for $7^2+5^2$<br>or **M1** for diagonal of base = 10 or half = 5 |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (b)(iii) | 59.5 or 59.48 to 59.51 | **3** | **M2** for $2 \times \text{inv tan } \frac{4}{7}$ oe<br>or **M1** for tan …= $\frac{4}{7}$<br>OR<br>**M2** for[cos ... = ] $\frac{\left(\sqrt{65}\right)^2+\left(\sqrt{65}\right)^2-8^2}{2\times\sqrt{65}\times\sqrt{65}}$ oe<br>or **M1** for correct implicit version of cosine rule |

32. 0607_s20_ms_43 Q: 7

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $2 \times 5 \times \cos 30$ | **M2** | or **M1** for $\frac{x}{5} = \cos 30$ oe |
| | 8.660... | **A1** | |
| (b) | 241 or 240.9... to 241.2... | **4** | **M1** for $3 \times 8.66 \times 5$<br>**M1** for $3 \times \frac{120}{360} \times \pi \times 5^2$<br>**M1** for $\frac{1}{2} \times 8.66^2 \times \sin 60$ |
| (c) | 2890 to 2895 | **1** | **FT** $12 \times$ *their* (b) |

33. 0607_w20_ms_41 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 11.2 or 11.19 to 11.20 | 3 | **M2** for $\sqrt{8.1^2+9.6^2-2\times8.1\times9.6\times\cos 78}$<br>OR<br>**M1** for $8.1^2+9.6^2-2\times8.1\times9.6\times\cos 78$<br>**A1** for 125 or 125.4... |
| (b) | $\sin DAC=\frac{9.6\times\sin 78}{their\textbf{(a)}}$ oe | M2 | **M1** for $\frac{9.6}{\sin DAC}=\frac{their\textbf{(a)}}{\sin 78}$ oe |
| | 56.97 to 57.05... | A1 | |
| (c) | 14.8 or 14.79 to 14.81 | 3 | **M2** for $BC=\frac{their\textbf{(a)}\times\sin(57+15)}{\sin 46}$<br>or **M1** for $\frac{BC}{\sin(57+15)}=\frac{their\textbf{(a)}}{\sin 46}$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (d) | 35.0 to 35.3 | 4 | **B1** for angle $ACB = 62$ soi<br>**M1** for<br>area $ABC=0.5\times their\textbf{(a)}\times their\textbf{(c)}\times\sin their(62)$<br>or $0.5\times their\textbf{(c)}\times(13.7\text{ or }13.74\text{ to }13.75)\times\sin 46$<br>or $0.5\times their\textbf{(a)}\times(13.7\text{ or }13.74\text{ to }13.75)\times\sin(57+15)$<br>**M1** for<br>area $ADC=0.5\times8.1\times9.6\times\sin 78$ oe |

34. 0607_s19_ms_41 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | Correct Pythagoras statement leading to $11^2 - 6^2$ or 121 – 36 or 85 | **M2** | or **M1** for $[BD]^2 + 6^2 = 11^2$ oe |
| | 9.219… | **A1** | 9.219… implies M1 A1 |
| (b) | 43.8 or 43.80... nfww | **3** | **M2** for $\cos[ABD] = \dfrac{9.22^2 + 13^2 - 9^2}{2 \times 9.22 \times 13}$ or better<br>or **M1** for $9^2 = 9.22^2 + 13^2 -$ $2 \times 9.22 \times 13 \cos [ABD]$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 69.1 or 69.13 to 69.14... nfww | **3** | **M1** for $0.5 \times 9.22 \times 6$ oe<br>**M1** for $0.5 \times 9.22 \times 13 \times \sin$ (*their* 43.8) oe |
| (d) | 17.7 or 17.69... | **3** | **M1** for $6^2 + 13^2 -$ $2 \times 6 \times 13 \cos (90 +$ *their* 43.8)<br>**A1** for 313 or 312.9 to 313.0 |

35. 0607_s19_ms_43 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $\tan 41 = \dfrac{FB}{5.5}$ oe | **M1** | e.g. $\dfrac{\sin 49}{5.5} = \dfrac{\sin 41}{FB}$ |
| | = 4.7810.. [= 4.781] | **A1** | |
| (b) | 37.6 or 37.63 to 37.64 | **2** | **M1** for $\tan[FCB] = \dfrac{4.781}{6.2}$ oe |
| (c) | $[CD =] \dfrac{4.781}{\tan 18} - 6.2$ oe | **M2** | **M1** for $\tan 18 = \dfrac{4.781}{BD}$ oe |
| | 8.5144... | **A1** | |
| (d) | 14.6 or 14.58 to 14.60 | **3** | **B2** for 212.7...<br>or **M1** for $[AD^2 =] 5.5^2 + (8.514 + 6.2)^2 -$ $2 \times 5.5 \times (8.514 + 6.2) \times \cos 78$ |
| (e) | 39.5 or 39.6 or 39.54 to 39.6[0] | **2** | **M1** for $0.5 \times 5.5 \times (8.514 + 6.2) \times \sin 78$ |

36. 0607_w19_ms_42 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $8^2+9^2-2\times8\times9\times\cos64$ | **M1** | |
| | 9.048… [= 9.05] | **A1** | |
| (b)(i) | [Area *ABD*] = $0.5\times8\times9\times\sin64$ | **M1** | |
| | Area *BDC* = 57.3 – *their ABD* | **M1** | |
| | *their* 24.94 = $0.5\times6.5\times9.05\times\sin BDC$ | **M1** | |
| | Angle *BDC* = 57.98 to 58.02 | **A1** | If 58.0… must see 58.0 not 58 alone |
| (b)(ii) | 77.4 to 77.54… | **5** | **M1** for $6.5^2+9.05^2-2\times6.5\times9.05\times\cos58$<br>**A2** for $\sqrt{61.8}$ or 7.86<br>or **A1** for 61.8 seen<br>**M1** for $\frac{\textit{their}\,7.86}{\sin58}=\frac{9.05}{\sin BCD}$ oe<br>or $\frac{1}{2}\times\textit{their}7.86\times6.5\times\sin BCD=\textit{their}\ 24.94$<br>or $9.05^2=6.5^2+(\textit{their}7.86)^2-$<br>$2\times6.5\times(\textit{their}7.86)\times\cos BCD$ or better |

37. 0607_s18_ms_41 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 12.2 or 12.21 to 12.22 | **2** | **M1** for $\sin70=\frac{[\ ]}{13}$ oe |
| (b) | 15.5 or 15.49… | **2** | **M1** for $\tan50=\frac{BD}{13}$ oe |
| (c) | 5.32 or 5.316 to 5.319… | **4** | **B1** for [angle *DBC* = ] 20<br>**M1** for $(\textit{their}BD)^2+15^2-2\times\textit{their}\ BD\times$ 15cos(*their DBC*)<br>**A1** for 28.26 to 28.30… |
| (d) | art 195 | **3** | **M2** two of<br>$0.5\times13\times13\times\sin40$ oe<br>$0.5\times13\times\textit{their}\ BD$ oe<br>$0.5\times15\times\textit{their}\ BD\times\sin(\textit{their}\ 20)$<br>or **M1** for one of above |

38. 0607_s18_ms_42 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[\cos A] = \frac{11^2 + 9.1^2 - 8.2^2}{2 \times 11 \times 9.1}$ | **M2** | **M1** for $8.2^2 = 11^2 + 9.1^2 - 2 \times 11 \times 9.1 \times \cos[\ ]$ |
| | 46.98 to 46.99 | **A1** | |
| (b) | $[\sin B =] \frac{11}{8.2} \times \sin 47.0$ | **M2** | **M1** for $\frac{8.2}{\sin 47} = \frac{11}{\sin B}$ |
| | 78.8 or 78.74 to 78.84 | **A1** | If 0 scored then **SC1** for correct answer from cosine rule or other method |
| (c) | 36.6 or 36.54 to 36.60… | **2** | **M1** for $0.5 \times 9.1 \times 11 \times \sin 47.0$<br>or **M1** for $0.5 \times 9.1 \times 8.2 \times \sin(\textit{their}\textbf{(b)})$<br>or **M1** for $0.5 \times 8.2 \times 11 \times \sin(180 - 47 - \textit{their}\ \textbf{(b)})$ |
| (d) | 6.65 or 6.66 or 6.647 to 6.656… | **2** | **M1** for $9.1 \times \sin 47.0$ oe or $\textit{their}\textbf{(c)} \div (0.5 \times 11)$ |

39. 0607_w18_ms_41 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $0.5 \times 8.6 \times 9.3 \times \sin A = 23.5$ | **M1** | |
| | 35.99... [ = 36.0] | **A1** | |
| (b) | $[x =] \sqrt{8.6^2 + 9.3^2 - 2 \times 8.6 \times 9.3 \times \cos 36}$ | **M2** | or **M1** for<br>$[x^2 =]\ 8.6^2 + 9.3^2 - 2 \times 8.6 \times 9.3 \times \cos 36$ |
| | 5.57 or 5.569 to 5.571... | **A1** | **M1** with correct answer scores full marks |
| (c) | $\sin B = \frac{9.3 \times \sin 36}{\textit{their}(\mathbf{b})}$ | **M2** | or **M1** for $\frac{9.3}{\sin B} = \frac{\textit{their}(\mathbf{b})}{\sin 36}$ |
| | 78.8 or 78.9 or 79.[0]<br>or 78.77 to 78.98... | **A1** | **M1** with correct answer scores full marks |

40. 0607_w18_ms_43 Q: 6

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 96.9 or 96.90… | **2** | **M1** for $0.5 \times 11 \times 23 \times \sin 50$ oe |
| (b) | 18[.0] or 18.02… | **3** | **B2** for 325 or 324.7…<br>or **M1** for<br>$11^2 + 23^2 - 2 \times 11 \times 23 \times \cos 50$ oe |

41. 0607_s17_ms_41 Q: 3

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 49.8 or 49.84 to 49.85 | 3 | **M2** for $\frac{30}{\sin 37}$ oe<br>or **M1** for $\sin 37 = \frac{30}{AC}$ oe |
| (b) | 39.7 or 39.8 or 39.74 to 39.81… | 3 | **M2** for $\frac{30}{\tan 37}$ or *their* (a) × cos 37 oe<br>or **M1** for $\tan 37 = \frac{30}{BC}$ or $\cos 37 = \frac{BC}{\textit{their}(a)}$ oe |
| (c) | 21.7 or 21.8 or 21.67 to 21.81 | 3 | **M2** for $\frac{30}{\tan 26} - \textit{their}(b)$<br>or $\frac{(\textit{their}(a)) \times \sin(180-(180-37)-26)}{\sin 26}$ oe<br>or **M1** for $\frac{30}{\tan 26}$<br>or $\frac{\textit{their}(a)}{\sin 26} = \frac{CD}{\sin(180-(180-37)-26)}$ oe |
| (d) | 325 or 326 or 327<br>or 325[.0] to 327.2 | 2 | **M1** for $\frac{1}{2}$ × *their* (c) × 30 oe |

42. 0607_s17_ms_42 Q: 9

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a)(i) | $\frac{1}{2} \times x \times (x+2) \times \frac{\sqrt{3}}{2}$ oe or better final answer | 2 | **M1** for $\frac{1}{2} \times x \times (x+2) \times \sin 60$ |
| (a)(ii) | equating to $18\sqrt{3}$ and correct elimination of $\sqrt{3}$ | M1 | **Dependent on correct answer used from (a)(i) or answer to (a)(i) contains sin60 but is otherwise correct.** |
| | Completion with at least one step | A1 | No errors or omissions |
| (b)(i) | 7.54 or 7.544... , –9.54 or –9.544... | 2 | **B1** for each<br>If 0 scored, **M1** for substitution in formula or sketch or $(x+1)^2 - 73$ or better |
| (b)(ii) | 6.53 or 6.54 or 6.529 to 6.536... | 2 | **M1** for $\sin 60 = \frac{[\ ]}{\textit{their}7.54}$ oe |

43. 0607_s16_ms_41 Q: 11

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | $9^2 = (3x-1)^2 + (2x)^2 - 2(2x)(3x-1)\cos 60$ oe | M1 | |
| | $81 = 9x^2 - 6x + 1 + 4x^2 - 6x^2 + 2x$ oe | A2 | or B1 for $9x^2 - 3x - 3x + 1$ |
| | $7x^2 - 4x - 80 = 0$ | A1 | Completion with no errors or omissions |
| (b) (i) | $\frac{-(-4) \pm \sqrt{(-4)^2 - 4\times 7\times(-80)}}{2\times 7}$ oe | M1 | or sketch of quadratic graph (any relevant one) with 1 positive root and 1 negative root |
| | $x = 3.68$ or 3.678... or –3.11 or – 3.107 to –3.106 | B2 | B1 for either |
| (ii) | [$AB$ =] 7.36 or 7.356 to 7.357 | 1FT | FT 2 × a positive root |
| | [$BC$ =] 10[.0] or 10.03 to 10.04 | 1FT | FT 3 × a positive root – 1 |
| (c) | 31.9 or 32[.0] or 31.85 to 32[.00] | 2FT | M1 for $\frac{1}{2}$ × *their AB* × *their BC* sin 60 oe |

44. 0607_s16_ms_42 Q: 11

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 5.4[0] or 5.396… | 2 | M1 for $\tan 34 = \frac{AB}{8}$ oe or better |
| (b) | 20.4 or 20.38… nfww | 5 | B1 for angle $D$ = 146 |
| | | | M2 for [sin$C$ =] $\frac{8\sin(theirD)}{19}$ |
| | | | or M1 for $\frac{8}{\sin C} = \frac{19}{\sin(theirD)}$ oe |
| | | | A1 for [angle $C$ =] 13.6 or 13.61 to 13.63 |
| | | | OR |
| | | | B1 for angle $A$ = 56 |
| | | | M2 for [sin$C$ =] $\frac{their\ AB \times \sin(theirA)}{19}$ |
| | | | or M1 for $\frac{their\ AB}{\sin C} = \frac{19}{\sin(theirA)}$ oe |
| | | | A1 for [angle $C$ =] 13.6 or 13.61 to 13.63 |
| (c) | 48[.0] or 48.1 or 48.04 to 48.12 cao | 2 | M1 for $0.5 \times their(a) \times 19 \times \sin(90 + their(b))$ oe |

45. 0607_s16_ms_43 Q: 5

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | $0.5\times12.4\times x\times\sin30$ [= 34.1] oe | 1 | |
| (b) | 6.21 or 6.205 to 6.206 | 3 | **B2** for 38.50 to 38.51<br>or **M1** for $11^2+12.4^2-2\times11\times12.4\times\cos30$ |
| (c) | 62.3 or 62.4 or 62.33 to 62.41… | 3 | **M2** for $\sin A=\frac{11\times\sin30}{their6.21}$<br>or $\cos A=\frac{12.4^2+(their(b))^2-11^2}{2\times12.4\times their(b)}$<br>or **M1** for $\frac{11}{\sin A}=\frac{their6.21}{\sin30}$ oe |
| (d) | 6.2 | 2 | **M1 for** $12.4\times\sin30$ oe |

46. 0607_w16_ms_42 Q: 8

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | $\frac{\sqrt{8}}{3}$ or $\frac{2\sqrt{2}}{3}$ or $\sqrt{\frac{8}{9}}$ | 3 | **M2** for $\frac{\sqrt{3^2-1^2}}{3}$<br>or **M1** for $3^2-1^2$<br>If 0 scored, **SC1** for 0.943 or 0.9428... or $\sqrt{0.889}$ |
| (b) (i) | $[\cos B]=\frac{9^2+10^2-11^2}{2\times9\times10}$ oe | 2 | **M1** for $11^2=9^2+10^2-2\times9\times10\times\cos B$ |
| (ii) | $0.5\times9\times10\times$ *their* exact (a) | M2 | **M1** for $0.5\times9\times10\times$ *their* (a)<br>(*their* (a) must be < 1) |
| | Leading to $30\sqrt{2}$ | A1 | Cancelling seen or $\frac{180\sqrt{2}}{6}$ or $\frac{90\sqrt{2}}{3}$ or $\frac{60\sqrt{2}}{2}$ seen |

47. 0607_w16_ms_42 Q: 9

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 21.5 or 21.45 to 21.46… | 2 | **M1** for $100 - \pi \times 5^2$ oe |
| (b) (i) | 5.77 or 5.773 to 5.774 | 2 | **M1** for $\tan 60 = \frac{10}{x}$ oe |
| (ii) | 21.5 or 21.54 to 21.55 | 2 | **M1** for $10 + 2 \times$ *their* (b)(i) oe<br>or $10 + \frac{10}{\sin 60}$ oe |
| (iii) | 100 to 101.0… nfww | 4 | **M3** for $0.5 \times 10 \times$ *their* (b)(i) + $0.5 \times 10 \times$ *their* (b)(i) + $0.5 \times 10 \times 10 \sin 60$ oe<br>or **M2** for any 2 of these<br>or **M1** for any 1 of these<br><br>OR<br><br>**M3** for $0.5 \times (\textit{their}(b)(ii))^2 \times \sin 60 - 10^2$ oe<br>or **M2** for $0.5 \times (\textit{their}(b)(ii))^2 \times \sin 60$ oe<br>or **M1** for *their* attempt at area of triangle *ABC* – 100 |

48. 0607_w15_ms_41 Q: 5

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 9.83 or 9.829 to 9.830 | 2 | **M1** for $\frac{BC}{12} = \cos 35$ or better |
| (b) | 59.2 or 59.16 to 59.17 | 3 | **M2** for [cos=] $\frac{12^2 + 10^2 - 11^2}{2 \times 12 \times 10}$<br>or **M1** for $11^2 = 12^2 + 10^2 - 2 \times 12 \times 10 \cos\theta$ |
| (c) | 85.3 or 85.4 or 85.34 to 85.37 | 3 | **M1** for $0.5 \times 12 \times \textit{their } BC \times \sin 35$ oe<br>**M1** for $0.5 \times 12 \times 10 \times \sin(\textit{their } CAD)$ oe |

49. 0607_w15_ms_42 Q: 12

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | 30.4 or 30.41… | **3** | **M1** for $x^2 = 15^2 + 20^2 - 2\times15\times20\times\cos120$<br>**A1** for 925 |
| **(b)** | $\sin B = \frac{20\sin120}{their30.4}$ | **M2** | **M1** for $\frac{20}{\sin B} = \frac{their30.4}{\sin120}$<br>becomes **M2** if 34.71 to 34.73… seen |
| | 34.71 to 34.73… | **A1** | |
| **(c)** | 116 or 115.8…. | **4** | **B1** for angle $A = 34.7$ or 34.71 to 34.73…<br>or angle $B = 55.3$ or 55.26... to 55.29<br>**M1** for $AB = \frac{12}{\sin their34.7}\ (=21.1)$ oe<br>**M1** for $AF = \frac{12}{\tan their34.7}\ (=17.3)$ oe |
| **(d)** | 414 or 413.7 to 413.9 | **3** | **M2** for $12\times15 + 0.5\times12\times their17.3 + 0.5\times15\times20\times\sin120$ oe<br>or **M1** for any correct area. |

50. 0607_w15_ms_43 Q: 1

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | 9.84 or 9.840 to 9.841 | **2** | **M1** for $\sin41 = \frac{BD}{15}$ oe or better |
| **(b)** | 83.6 or 83.64 to 83.65 | **2** | **M1** for 0.5 × 17 × *their* **(a)** oe |
| **(c)** | $17^2 + 15^2 - 2\times17\times15\cos41$<br>129 or 129.0 to 129.1<br>11.4 or 11.36… | **M1**<br>**A1**<br>**A1** | <br><br>If 0 scored **SC2** for 11.4 or 11.36… |

51. 0607_m21_ms_42 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 218 | **1** | |
| (b) | $4^2 + 17^2 - 2 \times 4 \times 17 \times \cos 142$ | **M2** | **M1** for implicit cosine rule |
| | 20.30… | **A1** | |
| (c) | 007 or 006.92 to 006.98 | **3** | **M2** for $\sin B = \frac{4\sin 142}{20.3}$ oe<br>or **M1** for $\frac{4}{\sin B} = \frac{20.3}{\sin 142}$ oe<br>OR<br>**M2** for $\sin A = \frac{17\sin 142}{20.3}$ oe<br>or **M1** for $\frac{17}{\sin A} = \frac{20.3}{\sin 142}$ oe |
| (d) | 11.5 or 11.47… | **3** | **B1** for 3 h 36 min or 3.6 h seen<br>**M1** for $\frac{4+17+20.3}{their 3.6}$ |

52. 0607_s21_ms_43 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $\frac{18^2+13^2-16^2}{2\times 18\times 13}$ | **M2** | **M1** for $16^2 = 18^2 + 13^2 - 2\times 18\times 13\cos(...)$ |
| | 59.574 to 59.575 | **A1** | |
| (b) | 164 or 163.8 to 163.9 | **3** | **M1** for $\frac{1}{2}\times 18\times 7$ oe<br>**M1** for $\frac{1}{2}\times 18\times 13\times \sin 59.57$ oe |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 15.5 or 15.52... | **2** | **M1** for $\sin 59.57 = \frac{\text{distance}}{18}$ oe |
| (d) | 191 or 190.5 to 190.6 | **6** | **M2** for $7^2 + 13^2 - 2\times 7\times 13\cos(90+59.57)$<br>or **B1** for [angle *BCD* =] 149.57<br><br>**M2** for $\frac{7\sin(90+59.57)}{their BD}$<br>or **M1** for $\frac{their BD}{\sin(90+59.57)} = \frac{7}{\sin DBC}$<br><br>**M1** for 180 + *their DBC* oe |

53. 0607_w21_ms_41 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | [cos =] $\frac{159^2 + 108^2 - 217^2}{2\times 159\times 108}$ | **M2** | **M1** for $217^2 = 159^2 + 108^2 - 2\times 159\times 108 \times \cos[ABC]$ |
| | 107.17 to 107.18 | **A1** | |
| (b)(i) | $\frac{159\sin 107.2}{217}$ | **M2** | **M1** for $\frac{\sin BAC}{159} = \frac{\sin 107.2}{217}$ |
| | 44.42 to 44.43 | **A1** | |
| (b)(ii) | 261 or 260.5 to 260.6 | **1** | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c) | 02 03 | **5** | **B4** for 3h 13 mins or 3.215 to 3.22 hours<br>OR<br>**M2** for 108 cos 44.4<br>or **M1** for $\cos 44.4 = \frac{[AN]}{108}$<br>**M1** for *their* 77.2 ÷ 24<br><br>If 0 scored, **SC1** for converting *their* time in hours to hours and minutes or minutes only |

54. 0607_s20_ms_42 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a)(i) | 138 | **1** | |
| (a)(ii) | 318 | **1** | **FT** *their* (i) + 180 |
| (b) | 48.8 or 48.78… | **2** | **M1** for $\tan[x=]\frac{6.13}{5.37}$ |
| (c) | 31.1 or 31.08… | **3** | **M2** for $\frac{6.13\times5.37}{2}+\frac{1}{2}\times6.13\times6.42\times\sin48$ or **M1** for $\frac{6.13\times5.37}{2}$ or $\frac{1}{2}\times6.13\times6.42\times\sin48$ |
| (d) | 5.11 or 5.111… | **3** | **B2** for 26.1… or **M1** for $6.13^2+6.42^2-2\times6.13\times6.42\times\cos48$ |
| (e) | 201 or 200.9 to 201.1… | **4** | **B3** for 69[.0] or 68.89 to 68.90 or **M2** for $\sin C=\frac{\sin48}{their(d)}\times6.42,\quad[C=69.0]$ or **M1** for $\frac{\sin C}{6.42}=\frac{\sin48}{their(d)}$ |

55. 0607_s20_ms_43 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 165 or 165.4... | **3** | **M1** for $80^2+120^2-2\times80\times120\times\cos110$ **A1** for 27 366 to 27 367 |
| (b) | 43[.0] or 42.97 to 43.11 | **3** | **M2** for $\frac{120\sin110}{their(a)}$ or **M1** for $\frac{\sin ABC}{120}=\frac{\sin110}{their(a)}$ |
| (c) | 283 | **2** | **FT** 240 + *their* (b) **B1** for 27 or 50 or 130 correctly identified at *C* |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (d) | 1525 | **5** | **M1** for cos (*their* (b)) = $\frac{x}{80}$<br>**A1** for 58.4 or 58.5 or 58.40 to 58.54<br>**M1** for *their* 58.5 ÷ 37<br>**M1** for correctly converting *their* time to hours and mins. |

56. 0607_w20_ms_42 Q: 6

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | $[\cos =]\frac{44^2+95^2-62^2}{2\times44\times95}$ | **M2** | **M1** for $62^2 = 44^2 + 95^2 - 2 \times 44 \times 95\cos[...]$ |
| | 31.64... | **A1** | |
| (b) | 145 or 145.4 to 145.5 | **3** | **B2** for [angle *DAC* =] 38.8 or 38.83 to 38.84<br>or **M1** for cos [*DAC*] = $\frac{74}{95}$ oe |
| (c) | 23.1 or 23.05 to 23.09 | **2** | **M1** for $\frac{distance}{44} = \sin 31.6$ oe |
| (d) | 3300 or 3296 to 3302 | **3** | **M1** for 0.5 × 95 × *their*(c) oe<br>**M1** for 0.5 × 74 × 95 × sin(*their* 38.8) oe |

57. 0607_s19_ms_42 Q: 11

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 118 or 117.7 to 117.8 | **3** | **M2** for $\frac{102}{\cos 30}$ oe<br>or **M1** for $\frac{102}{DC} = \cos 30$ oe<br>or 102 = *DC* × cos30 oe |
| (b) | 106 or 106.2... | **3** | **M1** for $110^2 + 102^2 - 2 \times 110 \times 102 \times \cos 60$<br>**A1** for 11 284 |
| (c) | 7860 or 7858 to 7870 | **3** | **M1** for 0.5 × 102 × *their DC* × sin30 oe (3000 or 3010 or 3001 to 3009)<br>**M1** for 0.5 × 102 × 110 × sin60 oe (4860 or 4858...) |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (d) | 236 or 236.2 to 236.4... | **4** | **B2** for 56.3 or 56.4 or 56.25 to 56.44...<br>or **M2** for $\frac{102\sin 60}{their\ AB}$ oe<br>or **M1** for $\frac{\sin 60}{their AB} = \frac{\sin BAD}{102}$ oe<br>**and M1** for 180 + *their* angle *BAD* oe |

58. 0607_w19_ms_41 Q: 7

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | [Angle $ABC$ = ] 120 | **B1** | |
| | $10^2 + 12^2 - 2\times10\times12\cos(their\ ABC)$ | **M1** | |
| | 19.078 to 19.079 | **A2** | **A1** for 364 |
| (b) | $\frac{10\sin120}{19.08}$ | **M2** | **M1** for $\frac{19.08}{\sin120} = \frac{10}{\sin ACB}$ oe |
| | 26.99... | **A1** | **M1** only and **A1** imply **M2 A1** |
| (c) | 249.8 to 250[.0] | **4** | **M2** for [$\cos ACD$ =]$\frac{21^2 + 19.08^2 - 18^2}{2\times21\times19.08}$ oe<br>or **M1** for<br>$18^2 = 21^2 + 19.08^2 - 2\times21\times19.08\times\cos(ACD)$<br>**M1** for 360 – (30 + 27 + *their ACD*) oe |
| (d) | 5.45 or 5.446 to 5.448 | **2** | **M1** for 12sin27.0 oe |
| (e) | 52[.0] or 51.94 to 51.99... | **2** | **M1** for $\frac{1}{2}\times19.08\times$ *their* **(d)**<br>or for $\frac{1}{2}\times10\times12\times\sin120$ oe<br>or for $\frac{1}{2}\times19.08\times12\times\sin27$ |

59. 0607_s18_ms_43 Q: 6

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (b) | $\begin{pmatrix}187 \text{ or } 187.1 \text{ to } 187.2\\ -46.5 \text{ or } -46.49...\end{pmatrix}$ | **5** | **M2** for *their* 72.5 + 140cos35 oe<br>or **M1** for $\frac{[...]}{140} = \cos 35$ oe seen (140cos35 oe)<br>**M2** for *their* 33.8 – 140sin35 oe<br>or **M1** for $\frac{[...]}{140} = \sin 35$ oe seen (140 sin35 oe) |
| (c)(i) | (*their* 187)$^2$ + (*their*[–] 46.5)$^2$ | **M1** | |
| | 193 or 192.6 to 192.9 | **B1** | |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (c)(ii) | $\tan[x] = \frac{\textit{their}\,46.5}{\textit{their}\,187}$ oe soi by 13.9... | **M1** | |
| | 284 or 283.9 to 284.0 | **B2** | **M1** for 270 + *their x* oe |

60. 0607_w18_ms_42 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 60.2 or 60.22 to 60.23. | **4** | **B1** for angle $ACB = 95$<br>**M2** for $\frac{120\sin(\textit{their}\,CAB)}{\sin(\textit{their}\,ACB)}$ oe<br>or **M1** for $\frac{BC}{\sin(\textit{their}\,CAB)} = \frac{120}{\sin(\textit{their}\,ACB)}$ |



| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (b) | 228 or 228.1 to 228.2 nfww | **4** | **M2** for $\cos[ABD] = \frac{120^2 + 90^2 - 80^2}{2\times 120\times 90}$<br>or **M1** for<br>$80^2 = 120^2 + 90^2 - 2 \times 120 \times 90 \cos ABD$<br>**A1** for 41.8 or 41.80 to 41.81 |

61. 0607_s17_ms_42 Q: 7

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | Correct sketch showing bearings and distances | **3** | **B1** for 310° bearing approx correct (270 to 360) and marked<br>**B1** for 250° bearing approx correct (180 to 270) and marked<br>**B1** for distances correctly marked |
| (b) | 120 | **1** | |
| (c) | $40^2 + 65^2 - 2\times40\times65\times\cos$ *their* 120 | **M1** | *their* 120 must be between 0 and 180<br>Allow $\cos 120 = \frac{40^2 + 65^2 - [\ ]^2}{2\times40\times65}$ |
| | 91.78 to 91.79 | **A2** | **A1** for 8425 or $5\sqrt{337}$ |
| (d) | 288 or 287.8... | **4** | **M2** for $\frac{40\sin(their120)}{91.8}$ oe<br>or **M1** for $\frac{\sin\theta}{40} = \frac{\sin(their120)}{91.8}$ oe<br>If cosine rule used, **M2** for explicit expression or **M1** for implicit.<br>**A1** for 22.2 or 22.16 to 22.17…<br>If 0 scored **SC2** for answer 108 or 107.8… |

62. 0607_w17_ms_41 Q: 8

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| (a) | 300° | **3** | **B1** for $ABN' = 150$ or $ABS' = 30$<br>**B1** for $N'BC = 120$ or $CBS' = 60$<br>OR<br>**B1** for $ACB = 35$<br>**B1** for $N'CB = 60$ |
| (b) | $\frac{60}{\cos 55}$ oe | **M2** | or **M1** for $\cos 55 = \frac{60}{AC}$ oe |
| | 104.60 to 104.62 | **A1** | |
| (c) | 9780 or 9776 to 9782. ... | **6** | **B1** for angle $ADC = 41$<br>**M2** for $[AD=]\frac{104.6\sin 76}{\sin(their\ 41)}$ (154.7...)<br>or **M1** for $\frac{104.6}{\sin(their\ 41)} = \frac{AD}{\sin 76}$<br>**M1** for $\frac{1}{2} \times 60 \times 104.6 \times \sin 55$ oe<br>**M1** for $\frac{1}{2} \times 104.6 \times their\ AD \times \sin 63$ oe |
| (d) | 93.2 or 93.16 to 93.23 | **2** | **M1** for $104.6 \times \sin 63$ oe |

63. 0607_w17_ms_42 Q: 10

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| **(a)(i)** | 125 | **1** | |
| **(a)(ii)** | 305 | **2** | **FT** *their* (i), Dep on (i) < 180<br>**M1** for 180 + *their*(i), Dep on (i) < 180 |

| Question | Answer | Marks | Partial Marks |
|---|---|---|---|
| **(b)** | 69.3 or 69.32 to 69.33 | **3** | **M1** for $90^2 + 120^2 - 2 \times 90 \times 120 \cos 35$<br>**A1** for 4806… |
| **(c)** | 60.3 or 60.28 to 60.29 | **3** | **M2** for $\frac{115 \sin 65}{120}$ oe<br>or **M1** for $\frac{115}{\sin BAC} = \frac{120}{\sin 65}$ oe |
| **(d)(i)** | 8730 or 8728 to 8730… | **4** | **M1** for $0.5 \times 90 \times 120 \times \sin 35$<br>**M2** for $0.5 \times 120 \times 115 \times \sin(180 - 65 - \textit{their}$ (c)) oe<br>or **M1** for angle $ACB = 180 - 65 - \textit{their}$ (c) |
| **(d)(ii)** | 349 or 349.1 to 349.2… | **3** | **FT** *their* (d)(i) ÷ 25<br>**M2** for *their* (i) ÷ 25 oe<br>or **M1** for squaring scale oe<br>or for figs 349 or 3491 to 3492 |

64. 0607_s16_ms_41 Q: 7

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | 19.9 or 19.89 to 19.90 | **3** | **M2** for $36^2 - 30^2$ soi by 396<br>or **M1** for $AD^2 + 30^2 = 36^2$ oe |
| **(b)** | 30 ÷ tan 68 oe | **M2** | **M1** for $\tan 68 = \frac{30}{AC}$ oe |
| | 12.12... | **A1** | |
| **(c)** | 301 or 301.3 to 301.4<br>or 239 or 238.6 to 238.7 | **3** | **B2** for 31.3 or 31.30 to 31.35<br>or **M1** for tan = 12.1 ÷ *their* (a) oe |

65. 0607_w16_ms_42 Q: 2

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| **(a)** | 2.83 or 2.828... | **3** | **B2** for $\sqrt{8}$ or $2\sqrt{2}$ final answer<br>or **M2** for $2^2 + 2^2$<br>or **M1** for correct sketch |
| **(b)** | 225 cao | **2** | **B1** for 45 soi by e.g. 135<br>If 0 scored **SC1** for 224.9 to 225.1 |
| **(c)** | 8 cao | **2** | **M1** for $2 \times 3 + 0.5 \times 2 \times 2$ oe |

66. 0607_w16_ms_43 Q: 8

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 360 – (155 + 115) oe | 1 | e.g. 25 + 65 with those angles marked on diagram |
| (b) | 36.9 or 36.86 to 36.87 | 2 | **M1** tan [$C$] = $\frac{60}{80}$ oe |
| (c) | 100 or 99.93 to 100.04 | 2 | **M1** for $60^2 + 80^2$ oe |
| (d) | 94.0 or 94.1 or 94.01 to 94.06 | 4 | **B1FT** for $ACD$ = 63.1 to 63.13<br>**M1** for $75^2 + (their\ 100)^2 - 2 \times 75 \times$ *their* 100 × cos *their* 63.1<br>**A1** for 8838 to 8846 |

| Question | Answer | Mark | Part Marks |
|---|---|---|---|
| (e) | 123 or 123.4 to 123.5 | 4 | **M2** for $\frac{75\sin(their 63.1)}{their 94.1}$<br>or for [cos = ] $\frac{(their 100)^2 + (their 94.1)^2 - 75^2}{2 \times (their 100) \times (their 94.1)}$<br>or **M1** for $\frac{\sin CAD}{75} = \frac{\sin(their 63.1)}{their 94.1}$<br>or for $75^2 = (their 100)^2 + (their 94.1)^2 - 2(their 100)(their 94.1)$<br>**A1** for 45.3 or 45.4 or 45.29 to 45.37 |

67. 0607_s15_ms_43 Q: 7

| Qu. | Answer | Mark | Part Marks |
|---|---|---|---|
| (a) | 86 [.0] or 86.03 to 86.04 | 2 | **M1** for $\frac{AB}{150} = \cos 55$ oe |
| (b) | 246° or 245.5 to 245.6 | 4 | **M2** for [cos =] $\frac{120^2 + 150^2 - 235^2}{2 \times 120 \times 150}$ (120.6)<br>or **M1** for $235^2 = 120^2 + 150^2 - 2 \times 120 \times 150 \cos\theta$<br>**M1** for 125 + *their* 120.6 |
| (c) | 13 000 or 13 030 to 13 035 | 3 | **M2** for $\frac{1}{2} \times 150 \times their 86 \times \sin 55$ oe<br>$+\frac{1}{2} \times 120 \times 150 \times \sin(their DAC)$ oe<br>or **M1** for 1 of above areas soi by 5283 to 5285. … or 7746. ... |