SCORE A+ ADD MATHS

SOLUTION OF TRIANGLES

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MRSM Pengkalan Chepa

MISSION TO PERFECT 10 S.O.T

- ONLY IN PAPER 2
- INVOLVE ONE QUESTION
- 10 MARKS
- LESS FORMULAE TO MEMORIZED

REMINDER!!

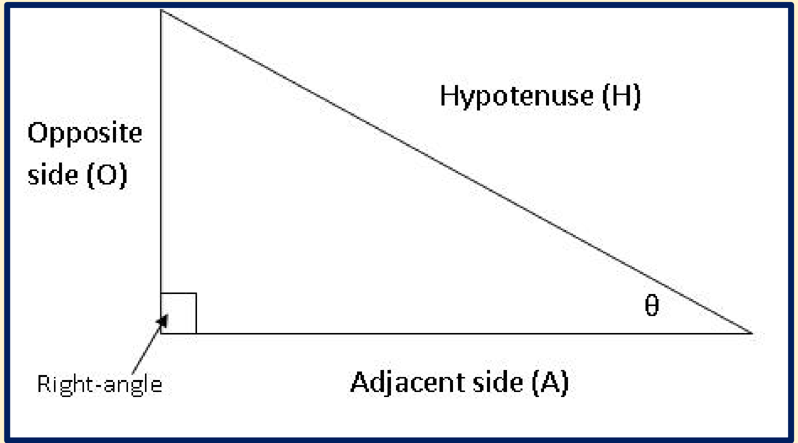
1. Always use at least 4 s.f(more is better)

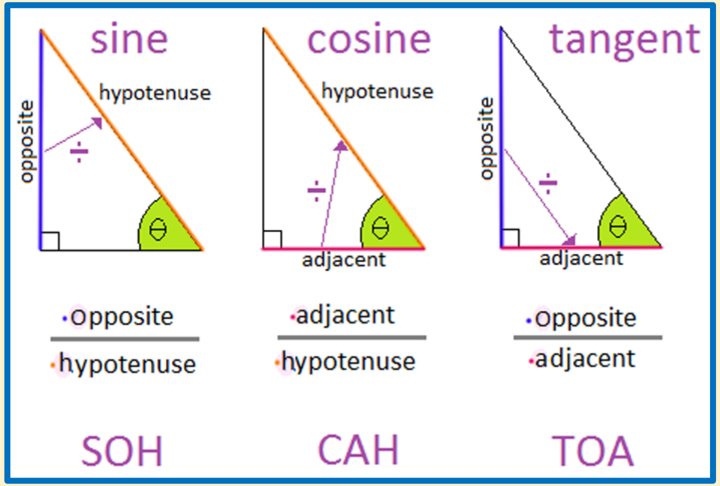
2. Use the value that you already write.
   Never use value that differ from you write.

3. Keep calm when look at questions

4. Write your working with neatly & clearly

FOR RIGHT ANGLE TRIANGLES IN TRIGONOMETRY





What happen when we DO NOT have a right angle triangle?

1

SINE RULE

LET'S INVESTIGATE TOGETHER

https://www.geogebra.org/m/k4mjyyzm

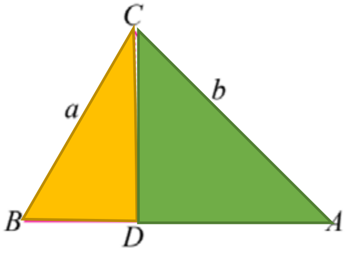


Diagram (a) Acute-angled triangle

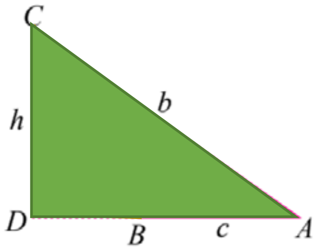


Diagram (b) Obtuse-angled triangle

For any acute-angled triangle and obtuse-angled triangle, the ratio of length of sides with the sine of the opposite angles are the same.

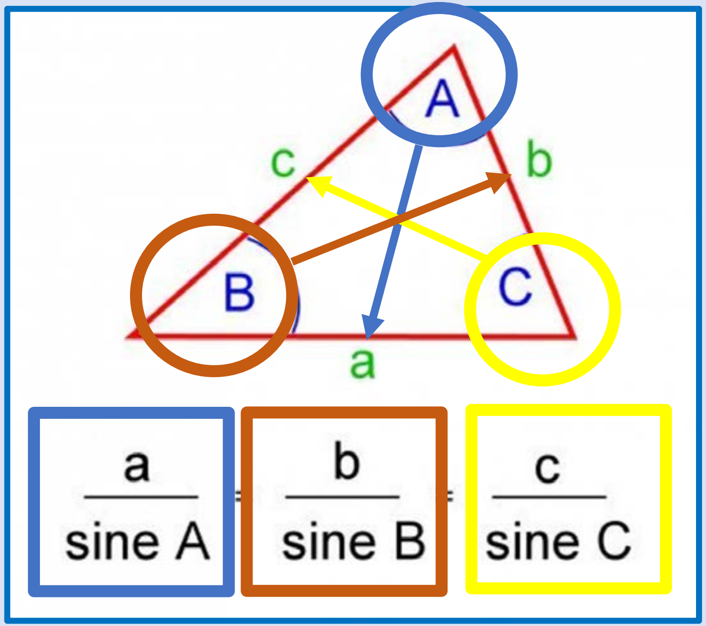
This relationship is known as the SINE RULE.

Sine rule

For any triangle ABC,

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

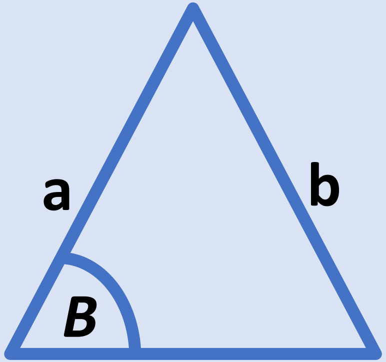
SINE RULE

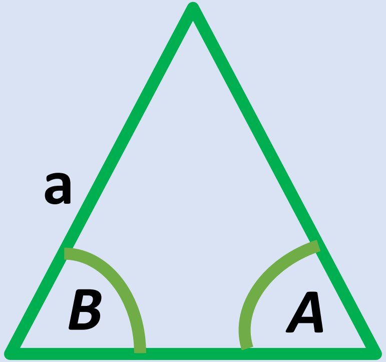


Angles always with capital letters & sides always with small letters

CONDITION

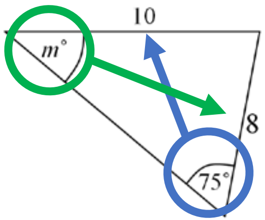
1. GIVEN 2 SIDES & 1 NON-INCLUDED ANGLE
2. GIVEN 2 ANGLES & 1 SIDE





SINE RULE

EXAMPLE 1



Find the value of m^o

SOLUTION

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

Step 1 write the formulae

$$\frac{\sin m°}{8} = \frac{\sin 75°}{10}$$

K1

Step 2 fill the values you know and the unknown angle

$$\sin m° = \frac{8(\sin 75°)}{10}$$

Step 3 solve the resulting equation

$$\sin m° = 0.7727$$

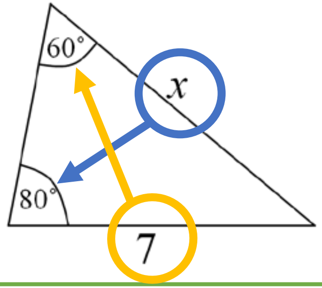
$$m° = 50.60°$$

N1

Use $sin^{-1}(0.7727)$

SINE RULE

EXAMPLE 2



Find the length of x.

SOLUTION

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

Step 1 write the formulae

$$\frac{x}{\sin 80°} = \frac{7}{\sin 60°}$$ K1

Step 2 fill the values you know and the unknown side

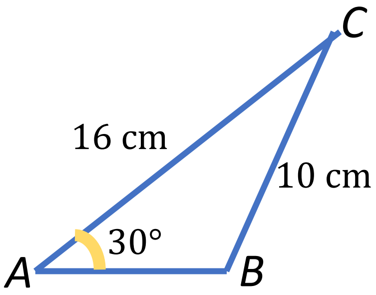
$$x = \frac{7(\sin 80°)}{\sin 60°}$$

Step 3 solve the resulting equation

$$x = 7.960 \text{ cm}$$ N1

AMBIGUOUS

EXAMPLE 3



In $\Delta ABC, a = 10$ cm, $b = 16$ cm and $\angle A = 30°$. Given that $\angle ABC$ is an obtuse.
Calculate the angle $\angle ABC$.

SOLUTION

$$\frac{\sin \angle ABC}{b} = \frac{\sin A}{a}$$

$$\frac{\sin \angle ABC}{16} = \frac{\sin 30°}{10}$$

$$\sin \angle ABC = \frac{16(\sin 30°)}{10}$$

$$\sin \angle ABC = 0.8$$

$$\angle ABC = \sin^{-1}(0.8)$$

$$\angle ABC = 53.13°$$

The question is wrong!!!!!

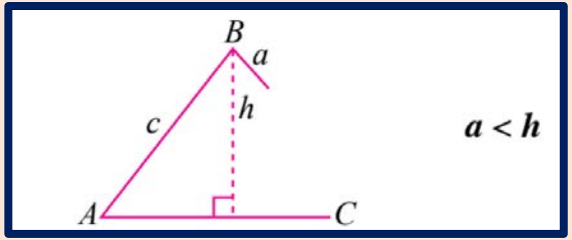
True or False?

Chill.....lets investigate

Is $\angle ABC$ an obtuse angle?

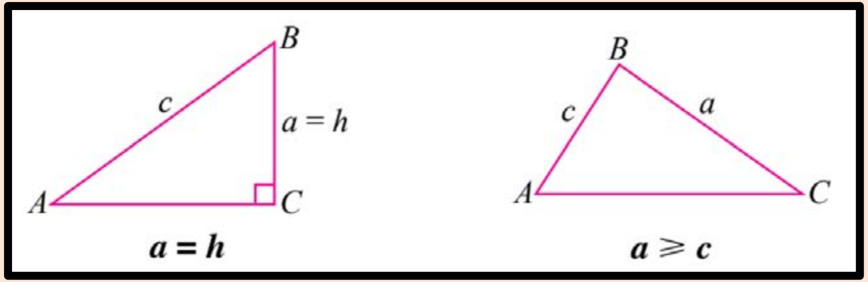
Condition: Given 2 sides + 1 non-included angle

Case 1



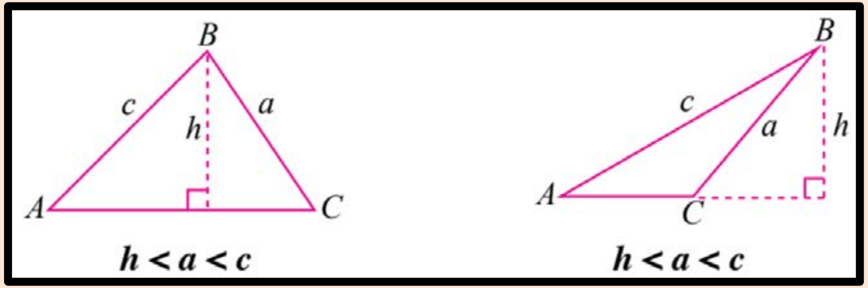
NO TRIANGLE EXIST

Case 2



ONE TRIANGLE EXIST

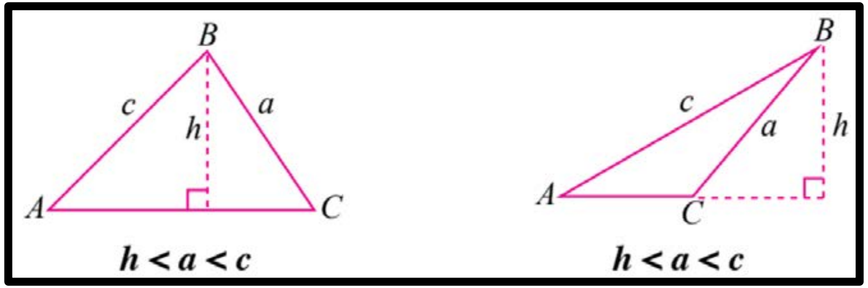
Case 3



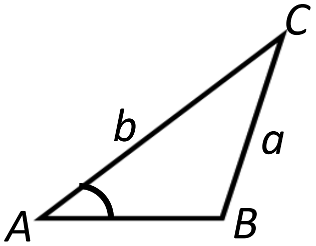
TWO TRIANGLES EXIST

https://www.geogebra.org/m/CvtkyRM5

Case 3



TWO TRIANGLE EXIST



Why this special case occurs?

Because the sine function being POSITIVE in Quadrant I & Quadrant II

This special case we called as

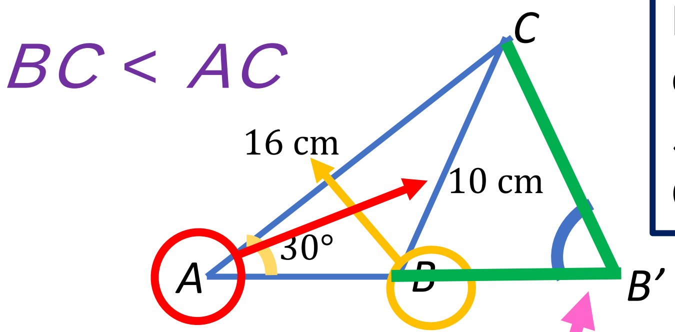
AMBIGUOUS

When ambiguous occurs?

1. GIVEN 2 SIDES & 1 NON-INCLUDED ANGLE
2. a < b and a>h

AMBIGUOUS

EXAMPLE 3



In $\Delta ABC, a = 10$ cm, $b = 16$ cm and $\angle A = 30°$. Given that $\angle ABC$ is an obtuse. Calculate the angle $\angle ABC$.

SOLUTION

$$\frac{\sin \angle ABC}{b} = \frac{\sin A}{a}$$

$$\frac{\sin \angle ABC}{16} = \frac{\sin 30°}{10}$$

$$\sin \angle ABC = \frac{16(\sin 30°)}{10}$$

$$\sin \angle ABC = 0.8$$

$$\angle ABC = \sin^{-1}(0.8)$$

$$\text{Reference angle} = 53.13^{\circ}$$

The other $\angle ABC$ in Quadrant 1 is acute

RECALL **POSITIVE sine** in Quadrant I & Quadrant II

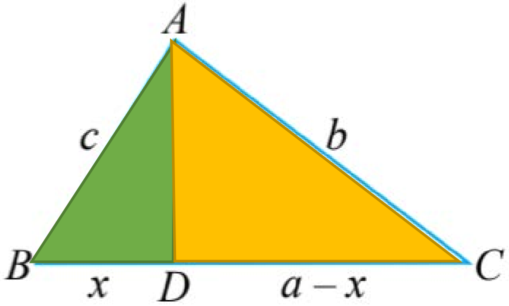
$$\angle ABC = 180^{\circ} - 53.13^{\circ}$$

$$\angle ABC = 126.87°$$

2

COSINE RULE

Consider the triangle *ABC* in the diagram



By using the Pythagoras Theorem in the triangle *ACD*,

Use the Pythagoras Theorem in the triangle *ABD*,

$$c^2 = h^2 + x^2$$

$$h^2 = c^2 - x^2 \quad \cdots \text{②}$$

$$b^2 = c^2 - x^2 + a^2 - 2ax + x^2$$

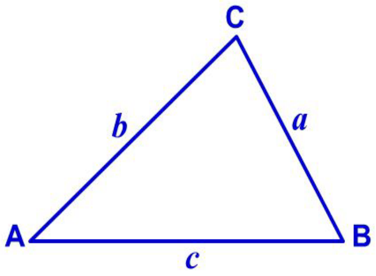
$$b^2 = c^2 + a^2 - 2ax \quad \cdots \text{③}$$

Substitute $x = c \cos B$ into ③.

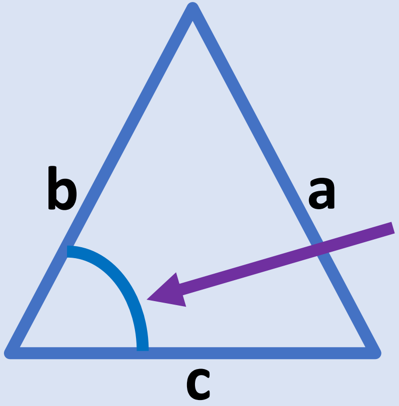
COSINE RULE

Cosine Rule – GeoGebra

If the triangle is not right-angled, and there is not a matching pair, you will need the Cosine Rule.



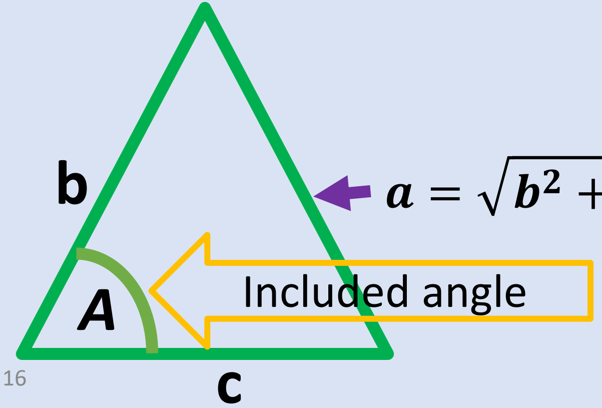
In any triangle *ABC* $a^2 = b^2 + c^2 - 2bc\cos A$



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

CONDITION

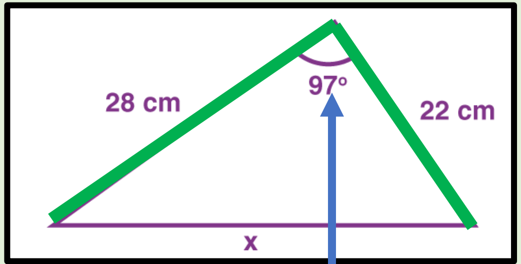
1. GIVEN ALL 3 SIDES
2. GIVEN 2 SIDES & 1 INCLUDED ANGLE



$$a = \sqrt{b^2 + c^2 - 2bc\ cosA}$$

COSINE RULE

EXAMPLE 4



Find the value of x.

GIVEN 2 SIDES + 1 INCLUDED ANGLE

Included angle

SOLUTION

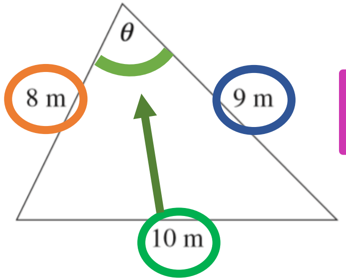
$$a = \sqrt{b^2 + c^2 - 2bc\,cosA}$$

$$x = \sqrt{28^2 + 22^2 - 2(28)(22)\cos 97°}$$ K1

$$x = 37.66 \text{ cm}$$ N1

COSINE RULE

EXAMPLE 5



Find the value of θ.

GIVEN ALL
3 SIDES

SOLUTION

To find the angle, put at LHS

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

Step 1 write the formulae

$$\cos\theta = \frac{8^2 + 9^2 - 10^2}{2(8)(9)}$$ K1

Step 2 fill the values you know and the unknown angle

$$\cos\theta = 0.3125$$

Step 3 solve the resulting equation

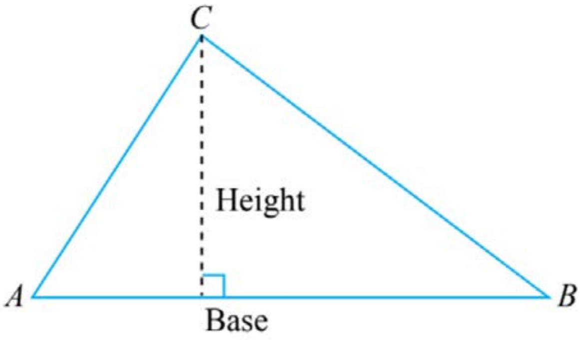
$$\theta = \cos^{-1}(0.3125)$$

$$\theta = 71.79°$$ N1

3

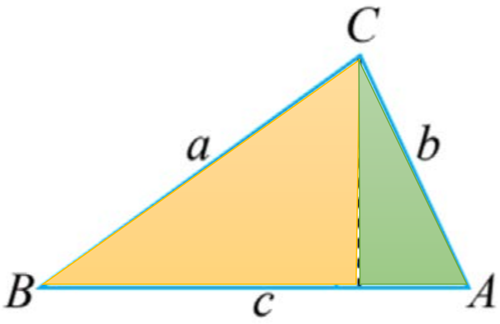
AREA OF TRIANGLE

AREA OF A TRIANGLE



$$\text{Area} = \frac{1}{2} \times \text{base} \times \text{height}$$

Can you find the area of a triangle without knowing the length of the base and the height?



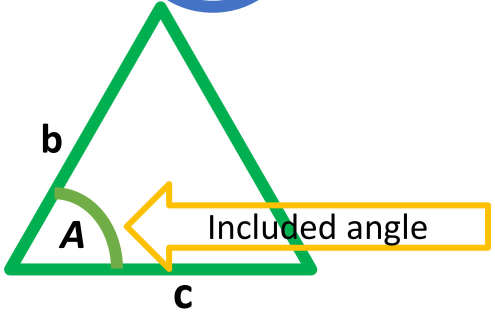
$h = a \sin B$
$h = b \sin A$

$$\text{Area} = \frac{1}{2} \times c \times a \sin B$$

OR

$$\text{Area} = \frac{1}{2} \times c \times b \sin A$$

Use when given 2 sides and 1 included angle



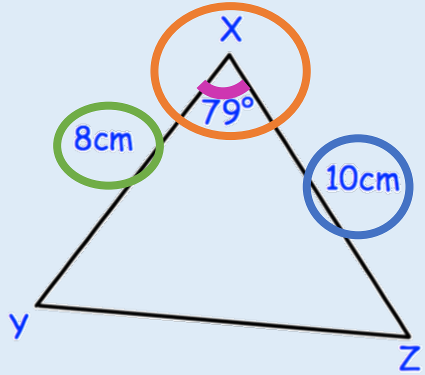
Therefore,

$$\text{Area} = \frac{1}{2} ab \sin C = \frac{1}{2} ac \sin B = \frac{1}{2} bc \sin A$$

AREA OF TRIANGLE

EXAMPLE 6

Calculate the area of ΔXYZ.



Check if your given angle is an included angle

SOLUTION

$$\text{Area} = \frac{1}{2}ab\sin C$$

Step 1 write the formulae

$$\text{Area} = \frac{1}{2}(8)(10)\sin 79°$$ K1

Step 2 fill the values you know

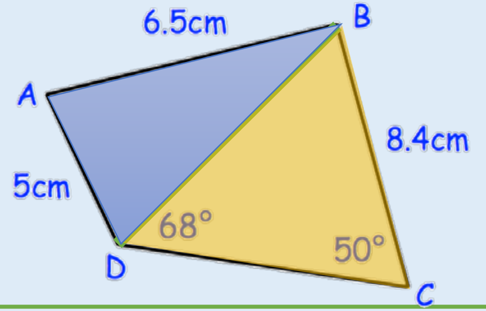
$$= 39.27\ \text{cm}^2$$ N1

Step 3 solve the resulting equation

AREA OF TRIANGLE

EXAMPLE 7

Calculate the area of ΔABD.



Step 1: Find length BD

$$\frac{BD}{\sin C} = \frac{BC}{\sin D}$$

$$\frac{BD}{\sin 50°} = \frac{8.4}{\sin 68°}$$

$$BD = \frac{8.4(\sin 50°)}{\sin 68°}$$

$$BD = 6.940 \text{ cm}$$

Use sine rule

Step 2: Find $\angle BAD$

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

$$\cos \angle BAD = \frac{5^2 + 6.5^2 - 6.940^2}{2(5)(6.5)}$$

$$\cos \angle BAD = 0.2936$$

$$\angle BAD = 72.93°$$

Use cosine rule

Step 3: Area of ΔABD

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2}(AD)(AB) \sin \angle BAD$$

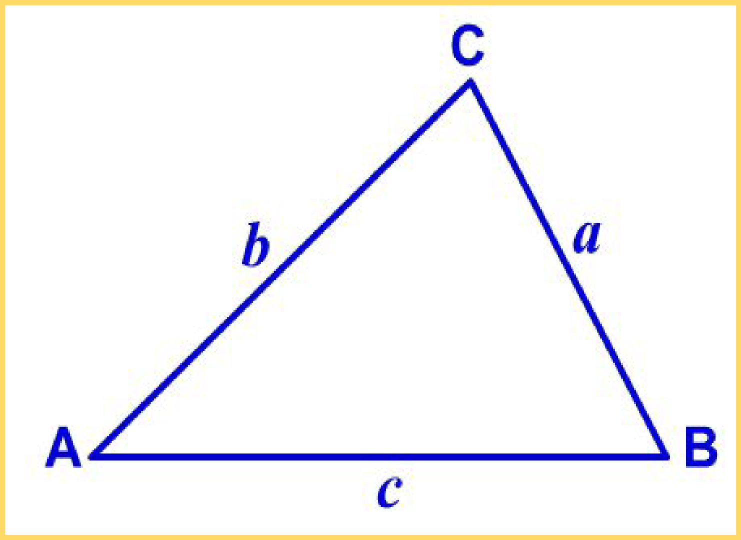
$$= \frac{1}{2}(5)(6.5) \sin 72.93°$$

$$= 15.53 \ cm^2$$

Use area formulae

WHAT IS HERON'S FORMULAE

- TO DETERMINE THE AREA OF TRIANGLE WHEN GIVEN THE LENGTHS OF SIDES???



First, find semi-perimeter, s:

$$s = \frac{a + b + c}{2}$$

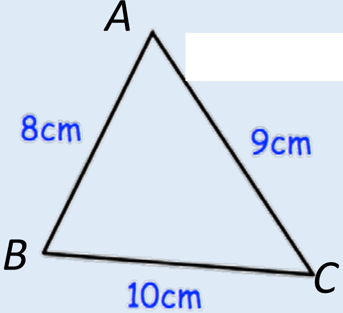
Therefore

Area $\Delta ABC = \sqrt{s(s-a)(s-b)(s-c)}$

HERON'S FORMULAE

EXAMPLE 8

Find the area of the ΔABC.



Find area using Heron's Formulae

Step 1: Find semi-perimeter

$$s = \frac{8+9+10}{2}$$

$$s = 13.5 \text{ cm}$$

$$s = \frac{a+b+c}{2}$$

Step 2: Find area of triangle

$$\text{Area} = \sqrt{s(s-a)(s-b)(s-c)}$$

$$\text{Area} = \sqrt{13.5(13.5-8)(13.5-9)(13.5-10)}$$

$$\text{Area} = \sqrt{1169.44}$$

$$\text{Area} = 34.20 \text{ cm}^2$$

Find area using $\frac{1}{2}ab\sin C$

Step 1: Find any angle, ex: $\angle BAC$

$$\cos\angle BAC = \frac{8^2+9^2-10^2}{2(8)(9)}$$

$$\cos\angle BAC = 0.3125$$

$$\angle BAC = 71.79°$$

Step 2: Find area of triangle

$$\text{Area} = \frac{1}{2}(8)(9)\sin 71.79°$$

$$\text{Area} = 34.20 \text{ cm}^2$$

4

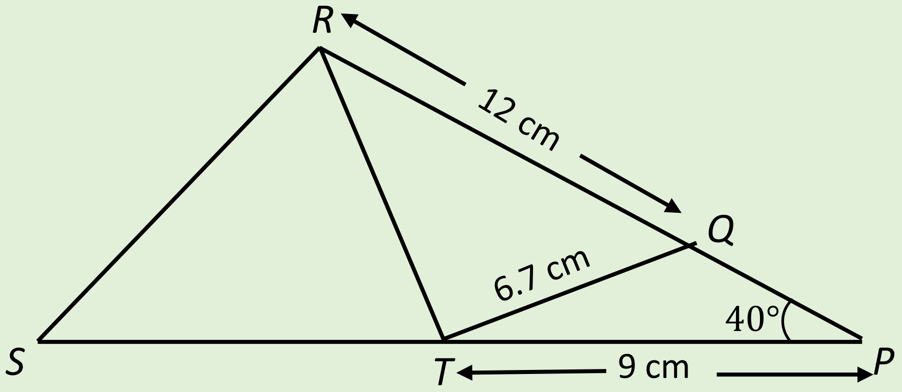
APPLICATION OF SINE RULE, COSINE RULE & AREA OF A TRIANGLE

APPLICATION

EXAMPLE 9

SPMRSM 2019
QUESTION 12

Diagram 8 shows a triangle PRS



It is given that PQR and PTS are straight lines and $\angle PQT$ is an obtuse angle.

(a) Find

(i) the length, in cm, of RT,

(ii) $\angle QTR$, **[6 marks]**

(b) If the area of triangle RST is $45 cm^2$, calculate the length, in cm, of ST.

[3 marks]

(c) Point Q' lies on RP such that $TQ' = TQ$. Sketch the triangle PTQ'.

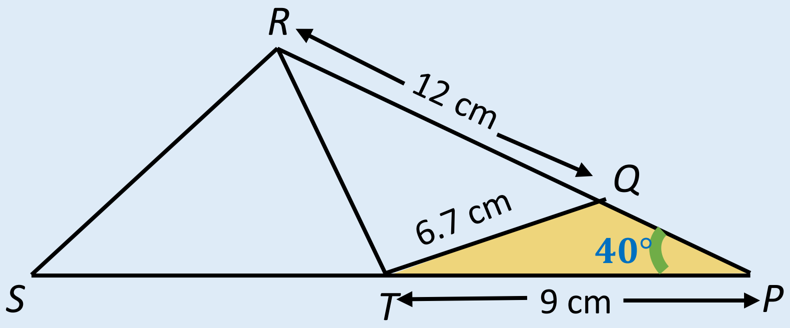
[1 mark]

SOLUTION 9a

It is given that PQR and PTS are straight lines and $\angle PQT$ is an obtuse angle.

(a) Find

(i) the length, in cm, of RT, **[4 marks]**



Find $\angle PQT$ using sine rule

$$\frac{\sin \angle PQT}{9} = \frac{\sin 40°}{6.7}$$ K1

$$\sin \angle PQT = \frac{9(\sin 40°)}{6.7}$$

$$\sin \angle PQT = 0.8634$$

$$\angle PQT = \sin^{-1}(0.8634)$$

$$\textbf{Reference angle} = 59.70^{\circ}$$

Take QII since $\angle PQT$ is an obtuse angle

$$\angle PQT = 120.3°$$

$$\angle RQT = 180° - 120.3°$$

$$\angle RQT = 59.70°$$ N1

Find length RT using cosine rule

$$a = \sqrt{b^2 + c^2 - 2bc\, cosA}$$

$$RT = \sqrt{12^2 + 6.7^2 - 2(12)(6.7)\cos 59.70°}$$ K1

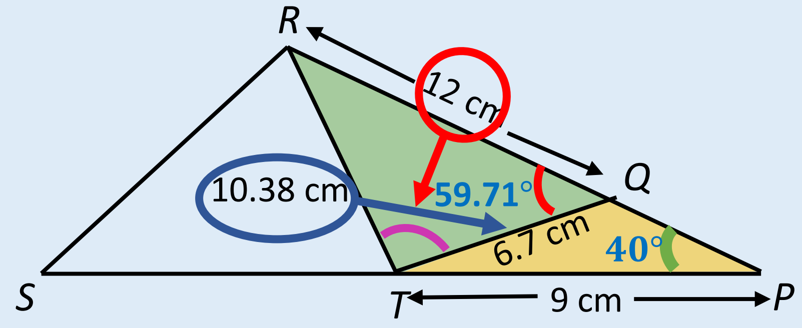
$$RT = 10.38 \text{ cm}$$ N1

SOLUTION 9a

It is given that PQR and PTS are straight lines and $\angle PQT$ is an obtuse angle.

(a) Find

(ii) $\angle QTR$, **[2 marks]**



Find $\angle QTR$ using sine rule

$$\frac{\sin \angle QTR}{12} = \frac{\sin 59.71°}{10.38} \quad \text{K1}$$

$$\sin \angle QTR = \frac{12(\sin 59.71°)}{10.38}$$

$$\sin \angle QTR = 0.9982$$

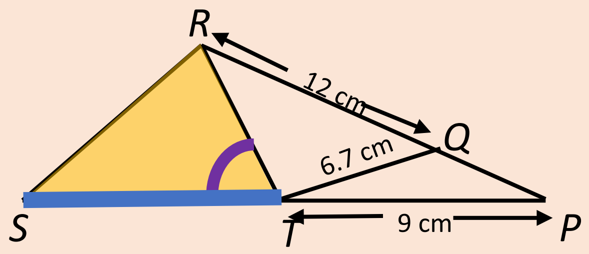
$$\angle QTR = \sin^{-1}(0.9982)$$

$$\angle QTR = 86.56° \quad \text{N1}$$

SOLUTION 9b & c

(b) If the area of triangle RST is $45 cm^2$, calculate the length, in cm, of ST. [3 marks]

(c) Point Q' lies on RP such that $TQ' = TQ$. Sketch the triangle PTQ'. [1 mark]



$\angle RQT = 59.71°$

$\angle QTR = 86.61°$

$\angle QTP = 180° - 120.29° - 40°$

$= 19.71°$

$\angle RTS = 180° - 86.61° - 19.71°$

$= 73.68°$ P1

Find length ST using formulae

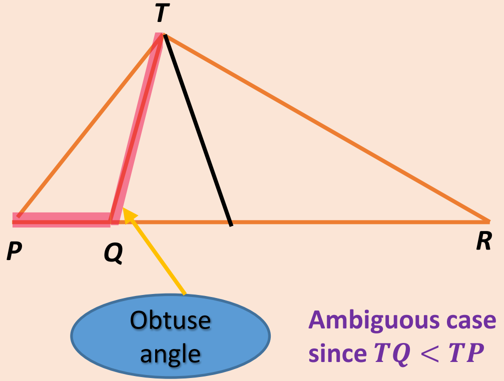
$$\text{Area} = \frac{1}{2} ab \sin C$$

$$= \frac{1}{2}(RT)(ST) \sin \angle RTS$$

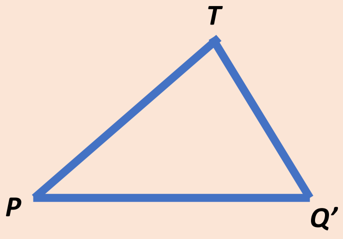
$$45 = \frac{1}{2}(10.38)(ST) \sin 73.68°$$ K1

$$ST = \frac{2(45)}{10.38(\sin 73.68°)}$$

$$= 9.035 \text{ cm}$$ N1



Ambiguous case exist since $TQ < TP$



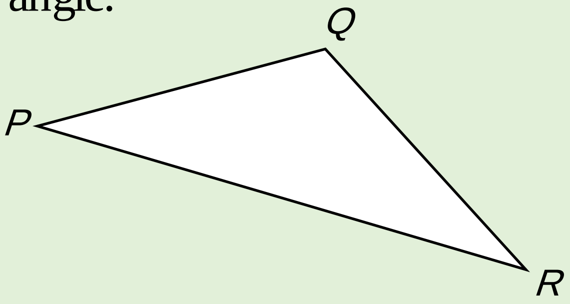
N1

APPLICATION

EXAMPLE 10

TRIAL SBP 2020
QUESTION 13

Diagram 7(a) shows an isosceles triangle PQR such that $PQ = QR = 10$ cm and $\angle PQR$ is an obtuse angle.



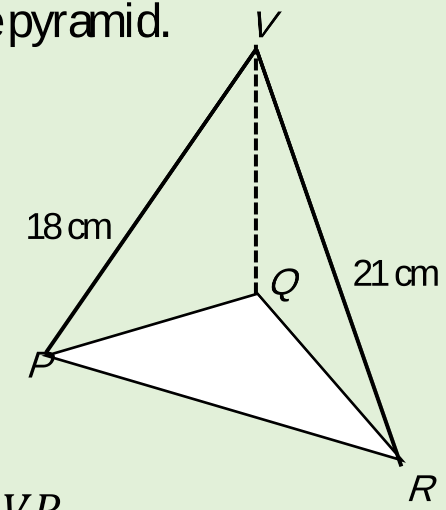
It is given that the area of triangle PQR is $49\ \text{cm}^2$.

(a) Find

(i) $\angle PQR$,

(ii) the length, in cm, of PR,

Triangle PQR in Diagram 7(a) is the base of a pyramid as shown in Diagram 7(b). V is the vertex of the pyramid.



(b) Find

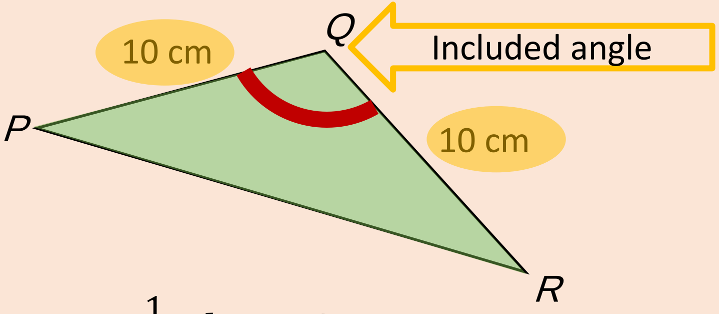
(i) $\angle PVR$,

(ii) the area, in cm^2, of ΔPVR,

(iii) the shortest distance, in cm, from point V to PR.

SOLUTION 10

i) Find $\angle PQR$ using area formulae



$$\text{Area} = \frac{1}{2} ab \sin C$$

$$49 = \frac{1}{2}(10)(10) \sin \angle PQR$$ K1

$$\sin \angle PQR = \frac{2(49)}{10(10)}$$

$$\sin \angle PQR = 0.98$$

$$\angle PQR = \sin^{-1}(0.98)$$

$$\text{Reference angle} = 78.52°$$

$$\angle PQR = 101.48°$$ N1

Take QII since $\angle \boldsymbol{PQT}$ is an obtuse angle

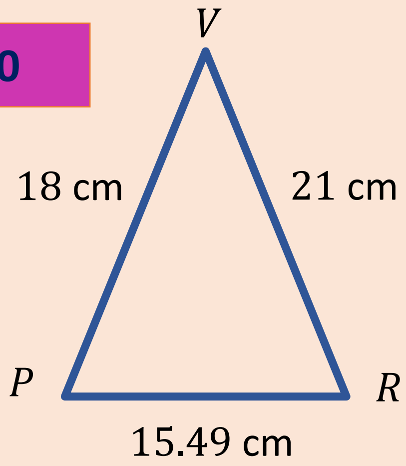
ii) Find length PR using cosine rule

$$PR = \sqrt{(PQ)^2 + (QR)^2 - 2(PQ)(QR)\cos \angle PQR}$$

$$PR = \sqrt{(10)^2 + (10)^2 - 2(10)(10)\cos \angle 101.48°}$$ K1

$$PR = 15.49 \text{ cm}$$ N1

SOLUTION 10



b i) Find $\angle PVR$ using cosine rule

$$\cos \angle PVR = \frac{18^2 + 21^2 - 15.49^2}{2(18)(21)}$$ K1

$$\cos \angle PVR = 0.6945$$

$$\angle PVR = \cos^{-1}(0.6945)$$

$$\angle PVR = 46.01°$$ N1

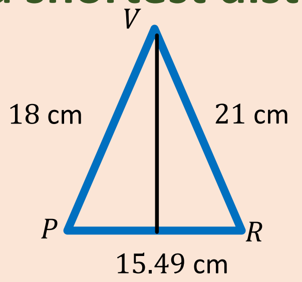
ii) Find area ΔPVR

$$\text{Area} = \frac{1}{2} ab \sin C$$

$$\text{Area} = \frac{1}{2}(18)(21) \sin 46.01°$$ K1

$$= 135.98 \text{ cm}^2$$ N1

iii) Find shortest distance from V to PR



$$135.98 = \frac{1}{2}(15.49)(h)$$ K1

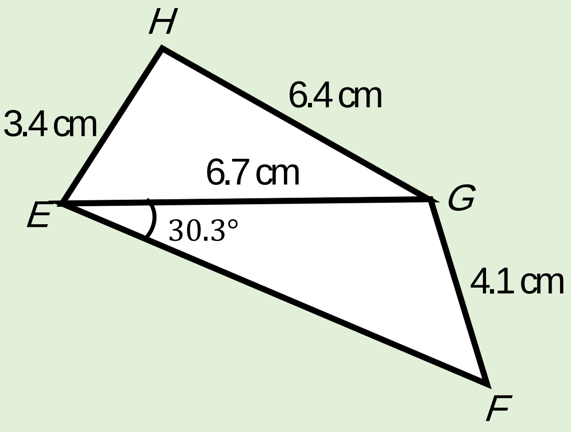
$$h = 17.56 \text{ cm}$$ N1

APPLICATION

EXAMPLE 11

TRIAL PUTRAJAYA 2020
QUESTION 14

Diagram 8 shows an quadrilateral $EFGH$ with $EG = 6.7$ cm, $EH = 3.4$ cm, $GH = 6.4$ cm, $FG = 4.1$ cm, $\angle FEG = 30.3°$ and $\angle EFG$ is an acute angle.



(a) Calculate

(i) $\angle EFG$,

(ii) $\angle EHG$,

(iii) the area of quadrilateral $EFGH$.

[7 marks]

(b) A triangle $E'F'G'$ with the measurements of $E'G' = 6.7$ cm, $F'G' = 4.1$ cm and $\angle F'E'G' = 30.3°$ has a different shape if compared to triangle EFG.

(i) Sketch the triangle $E'F'G'$,

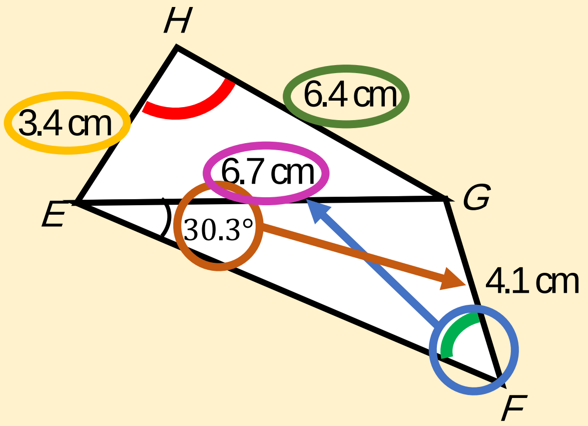
(ii) Calculate the angle $\angle E'F'G'$. [3 marks]

SOLUTION 11a

(a) Calculate

(i) $\angle EFG$,

(ii) $\angle EHG$, [3 marks]



a i) Find $\angle EFG$ using sine rule

$$\frac{\sin \angle EFG}{EG} = \frac{\sin \angle GEF}{FG}$$

$$\frac{\sin \angle EFG}{6.7} = \frac{\sin 30.3°}{4.1}$$ K1

$$\sin \angle EFG = 0.8245$$

$$\angle EFG = \sin^{-1}(0.8245)$$

$$\angle EFG = 55.53°$$ N1

a ii) Find $\angle EHG$ using cosine rule

$$\cos \angle EHG = \frac{EH^2 + HG^2 - EG^2}{2(EH)(HG)}$$

$$\cos \angle EHG = \frac{3.4^2 + 6.4^2 - 6.7^2}{2(3.4)(6.4)}$$ K1

$$\cos \angle EHG = 0.1753$$

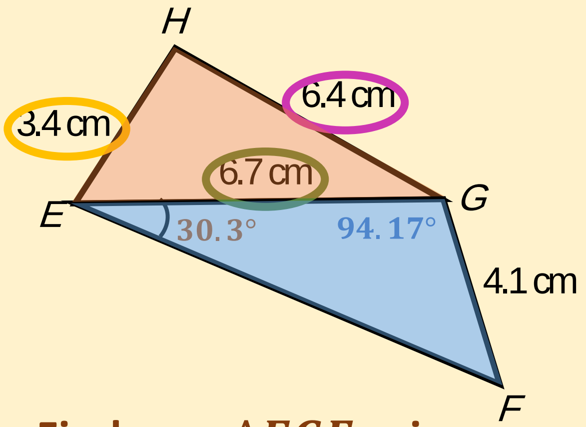
$$\angle EHG = \cos^{-1}(0.1753)$$

$$\angle EHG = 79.91°$$ N1

SOLUTION 11a

(a) Calculate

(iii) the area of quadrilateral $EFGH$. [4 marks]



a iii) Find area $EFGH$

Step 1 : Find area ΔEHG using Heron's formulae

$$s = \frac{3.4 + 6.4 + 6.7}{2}$$

$= 8.25$ cm

$$s = \frac{a+b+c}{2}$$

$$\text{Area } \Delta EHG = \sqrt{s(s-a)(s-b)(s-c)}$$

$$= \sqrt{8.25(8.25-3.4)(8.25-6.4)(8.25-6.7)}$$ K1

$$\text{Area } \Delta EHG = \mathbf{10.71\ cm^2}$$

Step 2 : Find area ΔEGF using area formulae

$$\text{Area } \Delta EGF = \frac{1}{2}(EG)(GF)\sin\angle EGF$$

$$= \frac{1}{2}(6.7)(4.1)\sin 94.17°$$ K1

$$\text{Area } \Delta EGF = \mathbf{13.70\ cm^2}$$

Step 3 : Find area $EFGH$

$\text{Area } EFGH = 13.70 + 10.71$ K1

$\text{Area } EFGH = \mathbf{24.41\ cm^2}$ N1

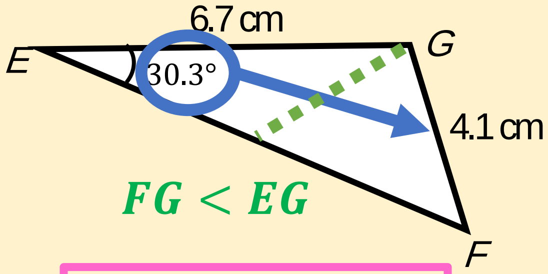
SOLUTION 11b

(b) A triangle $E'F'G'$ with the measurements of $E'G' = 6.7$ cm, $F'G' = 4.1$ cm and $\angle F'E'G' = 30.3°$ has a different shape if compared to triangle EFG.

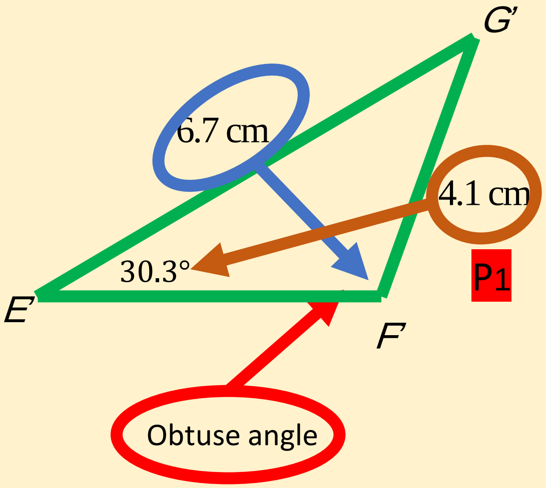
(i) Sketch the triangle $E'F'G'$,

(ii) Calculate the angle $\angle E'F'G'$. [3 marks]

b i) Sketch a new triangle



If given ACUTE triangle, will produce OBTUSE triangle



ii) Find angle $\angle E'F'G'$

$$\frac{\sin \angle E'F'G'}{EG} = \frac{\sin \angle G'E'F'}{F'G'}$$

$$\frac{\sin \angle E'F'G'}{6.7} = \frac{\sin 30.3°}{4.1} \quad \text{K1}$$

$$\sin \angle E'F'G' = 0.8244$$

$$\textbf{Reference angle} = 55.53° \leftarrow \angle EFG$$

$$\angle E'F'G' = 180° - 55.53°$$

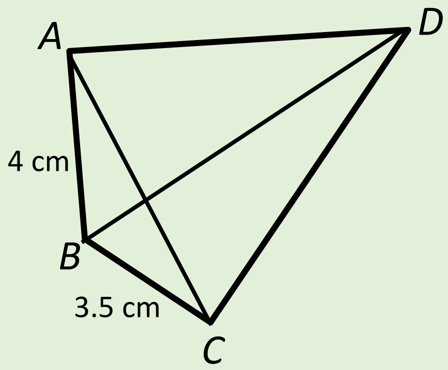
$$\angle E'F'G' = 124.47° \quad \text{N1}$$

APPLICATION

EXAMPLE 12

SPM 2019
QUESTION 13

Solution by scale drawing is not accepted.
Diagram 6 shows an quadrilateral $ABCD$ such that AC and BD are straight lines.



It is given that the area of $\Delta ABC = 6 \text{ cm}^2$ and $\angle ABC$ is obtuse.

(a) Find

(i) $\angle ABC$,

(ii) the length, in cm, of AC,

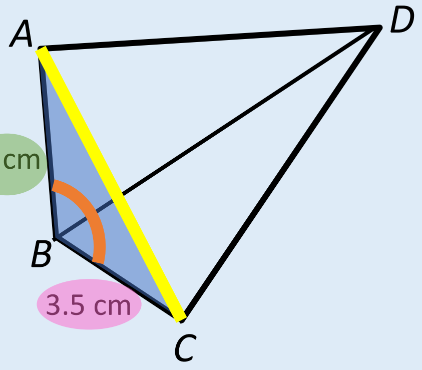
(iii) $\angle BAC$.

[7 marks]

(b) Given $BD = 7.3$ cm and $\angle BCD = 90°$, calculate the area, in cm^2 of ΔACD.

[3 marks]

SOLUTION 12a



(a) Find

(i) $\angle ABC$,

(ii) the length, in cm, of AC,

i) Find $\angle ABC$ using area formulae

$$\text{Area} = \frac{1}{2}ab\sin C$$

2 sides + I included angle

$$6 = \frac{1}{2}(4)(3.5)\sin\angle ABC$$ K1

$$\sin\angle ABC = \frac{2(6)}{4(3.5)}$$

$$\sin\angle ABC = 0.8571$$

$$\textbf{Reference angle} = 58.99^\circ$$ P1

$$\angle ABC = 121.01^\circ$$ N1

Take Quadrant II because $\angle ABC$ is obtuse

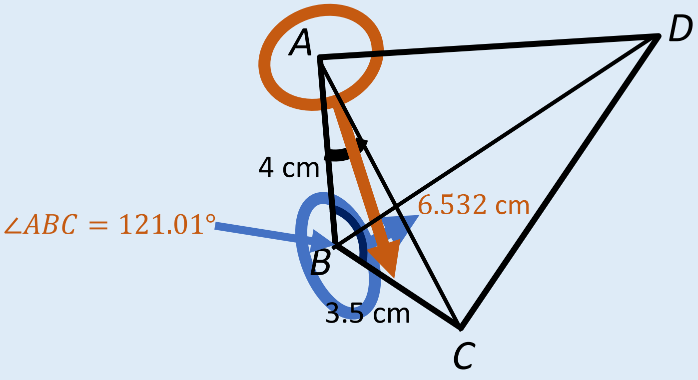
ii) Find length AC using cosine rule

$$AC = \sqrt{(AB)^2 + (BC)^2 - 2(AB)(BC)\cos\angle ABC}$$

$$AC = \sqrt{(4)^2 + (3.5)^2 - 2(4)(3.5)\cos\angle 121.01^\circ}$$ K1

$$AC = 6.532 \text{ cm}$$ N1

SOLUTION 12a



(a) Find

(iii) $\angle BAC$. [2 marks]

iii) Find $\angle BAC$ using sine rule

$$\frac{\sin \angle BAC}{BC} = \frac{\sin \angle ABC}{AC}$$

$$\frac{\sin \angle BAC}{3.5} = \frac{\sin 121.01°}{6.532}$$ K1

$$\sin \angle BAC = 0.4593$$

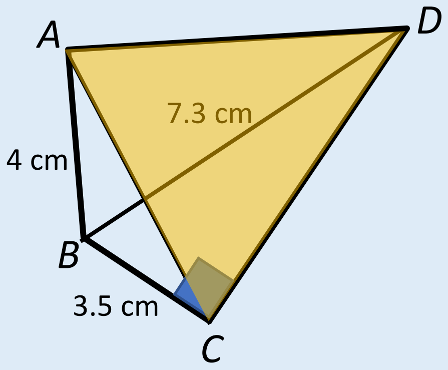
$$\angle BAC = \sin^{-1}(0.4593)$$

$$\angle BAC = 27.34°$$ N1

SOLUTION 12b

(b) Given $BD = 7.3$ cm and $\angle BCD = 90°$, calculate the area, in cm^2 of ΔACD.

[3 marks]



$\angle BCA = 180° - 121.01° - 27.34°$

$\angle BCA = 31.65°$

$CD = \sqrt{BD^2 - BC^2}$

$CD = \sqrt{7.3^2 - 3.5^2}$

Use phytagoras theorem

$CD = 6.406$ P1

$\angle ACD = 90° - 31.65°$

$\angle ACD = 58.35°$

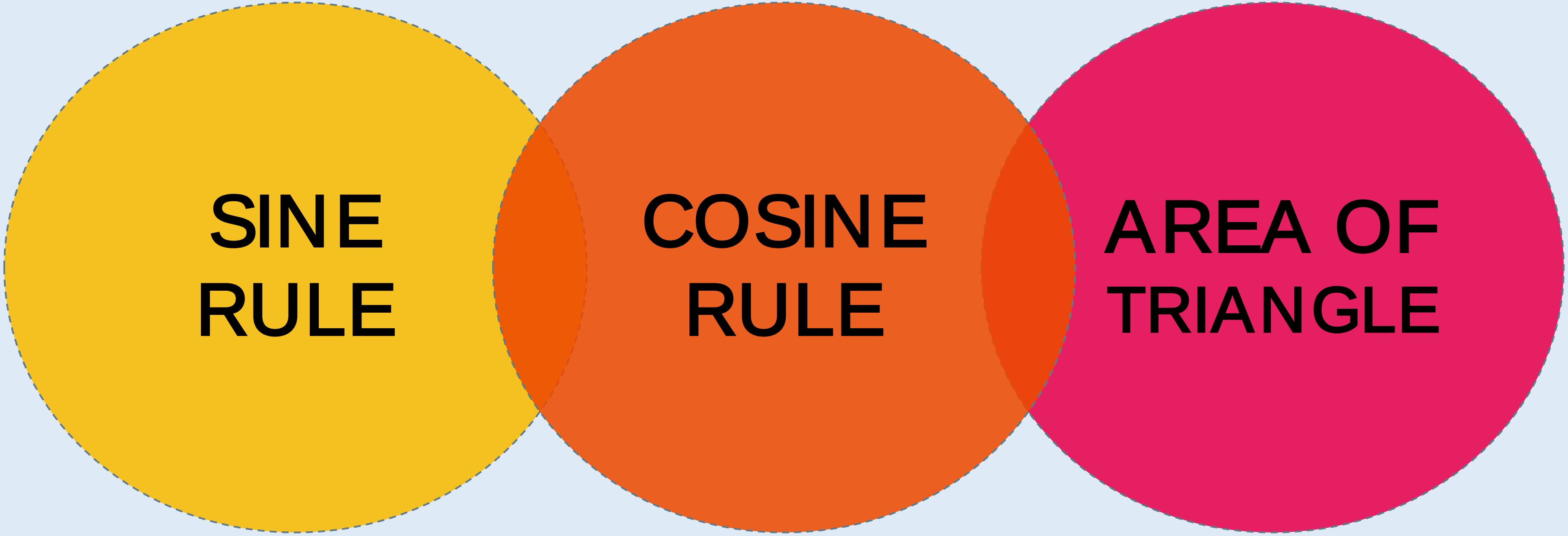
2 sides + I included angle

$\text{Area} = \frac{1}{2}(AC)(CD)\sin\angle ACD$

$\text{Area} = \frac{1}{2}(6.532)(6.406)\sin 58.35°$ K1

$= 17.81cm^2$ N1

CHAPTER OVERVIEW



Contoh Jawapan Cemerlang

a. $\frac{\sin \angle BDC}{20.5} = \frac{\sin 64}{22}$

$\angle BDC = 56.88^\circ$

b. $\angle BCD = 180 - 56.88 - 64 = 59.12^\circ$

$BD^2 = 20.5^2 + 22^2 - 2(20.5)(22)\cos 59.12^\circ$

$BD = 21.01\text{ m}$

c. $VD = \sqrt{5^2 + 10^2} = 11.18\text{ m}$ $\quad VB = \sqrt{5^2 + 12^2} = 13\text{ m}$

$13^2 = 11.18^2 + 21.01^2 - 2(11.18)(21.01)\cos \angle VDB$

$\angle VDB = 32.23^\circ$

Area of $BVD = \frac{1}{2}(11.18)(21.01)\sin 32.23^\circ = 62.64\text{ m}^2$

Dalam bahagian (a), calon dapat menggunakan **petua sinus** untuk mencari $\angle BDC$.
Dalam bahagian (b), calon dapat menggunakan **petua sinus atau kosinus** untuk mencari panjang bagi BD.
Dalam bahagian (c), calon dapat mencari panjang BV dan panjang DV menggunakan **Teorem Pithagoras** dan mencari mana-mana sudut dalam segi tiga BVD menggunakan petua kosinus bagi membolehkan calon dapat mencari **luas bagi satah condong BVD**.

Contoh Jawapan Sederhana

a) $\frac{20.5}{\sin \angle BDC} = \frac{22}{\sin 64^\circ}$

$\angle BDC = 56.88^\circ$

b) $BCD = 180^\circ - 64^\circ - 56.88^\circ$

$= 59.12^\circ$

$BD^2 = (20.5)^2 + (22)^2 - 2(20.5)(22)(\cos 59.12^\circ)$

$= 904.25 - 462.94$

$= 441.31$

$BD = \sqrt{441.31}$

$= 21$

c) $VD^2 = 10^2 + 5^2$ $\quad VB^2 = 5^2 + 12^2$

$= 125$ $\quad = 169$

$VD = 11.18$ $\quad VB = 13$

$\text{Area} = \frac{1}{2}(13)(11.18)(\sin 59.12)$

$= 62.369$

Calon mampu menggunakan kaedah yang betul bagi bahagian (a) dan (b) tetapi kesilapan calon ialah **membundarkan jawapan kepada integer**.
Dalam bahagian (c), calon tidak dapat mencari mana-mana sudut dalam segi tiga BVD menggunakan petua kosinus. Ini menyebabkan calon tidak dapat memberi **jawapan yang tepat** bagi luas segi tiga.

TERIMA KASIH
JUMPA LAGI

Siri Jom Skor A+ Matematik Tambahan

SPM 2021

22 Aug
8.00 pm – 10.00 pm
Sahlawati Zakaria | MRSM Kuala Krai
Functions

27 Aug
8.00 pm – 10.00 pm
Norlela Sapari | MRSM Taiping
Quadratic Functions

31 Aug
8.00 pm – 10.00 pm
Khairulbariah Khairuddin | MRSM Mersing
Systems of Equations

4 Sept
8.00 pm – 10.00 pm
Hazlina Ahmad | MRSM Alor Gajah
Indices, Surds and Logarithms

10 Sept
8.00 pm – 10.00 pm
Hasniza Ismail | MRSM Parit
Progressions

16 Sept
3.00 pm – 5.00 pm
Rosdiana Sarju | MRSM Johor Bahru
Linear Law

24 Sept
8.00 pm – 10.00 pm
Nur Suhaila Abu Bakar | MRSM Tumpat
Coordinate Geometry
New Speaker

26 Sept
8.00 pm – 10.00 pm
Mohd Faizi Mamat | MRSM Gemencheh
Vectors

1 Oct
8.00 pm – 10.00 pm
Abdul Hadi Azmi | MRSM Pengkalan Chepa
Solution of Triangles

8 Oct
8.00 pm – 10.00 pm
Noraini Ismail | MRSM Transkrian
Index Numbers

10 Oct
8.00 pm – 10.00 pm
Hariani Abidin | MRSM Kuching
Circular Measure

15 Oct
8.00 pm – 10.00 pm
Erwan Hazreen Musa | MRSM Bentong
Differentiation

18 Oct
8.00 pm – 10.00 pm
Mohamad Fauzi Razak | MRSM Kepala Batas
Integration
New Date

23 Oct
8.00 pm – 10.00 pm
Muhamad Baginda Zainuddin | MRSM Batu Pahat
Kinematics of Linear Motion
New Date

30 Oct
3.00 pm – 5.00 pm
Haziq Syazwan Sajali | MRSM Tun Mustapha
Trigonometric Function
New Date

5 Nov
3.00 pm – 5.00 pm
Suhaila Sulong | MRSM Tun Dr. Ismail
Permutation and Combination
New Date

7 Nov
8.00 pm – 10.00 pm
Norhafizah Mohamed Yusoff | MRSM K. Terengganu
Probability Distribution
New Date

17 Dis
8.00 pm – 10.00 pm
Asniza Arshad | MRSM Tun Ghaffar Baba
Linear Programming

Anjuran Unit Matematik
Bahagian Pendidikan Menengah MARA

Sesi webinar *live* melalui Microsoft Teams