education equals

Topic: Non-Calculator Trigonometry

Time: 45 mins Marks: /45 marks

No calculator allowed

Question One: [2, 2, 2: 6 marks]

Solve the following:

a) $0.3 = \frac{6}{x}$

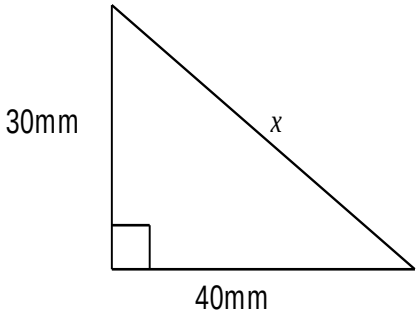
b) $0.26 = \frac{y}{12}$

c) $z^2 + 3^2 = 5^2$

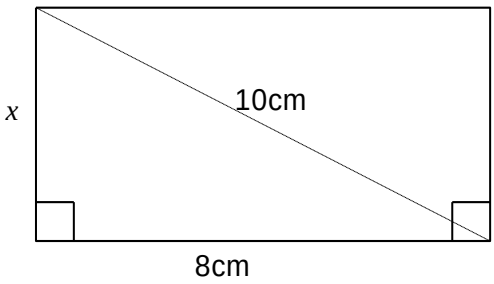
Question Two: [3, 3: 6 marks]

Calculate the length of the unknown side.

a)

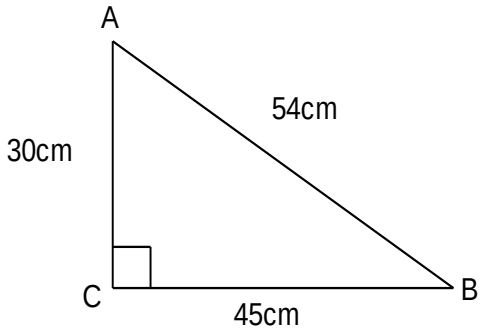


b)



Question Three: [2, 2: 4 marks]

Consider the following triangle.

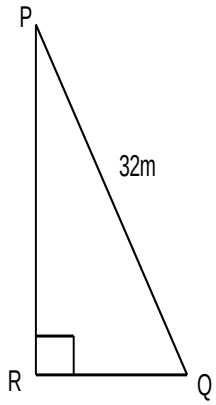


a) Determine the value of $sin \angle BAC$.

b) If the lengths of the sides of the triangle were all doubled in size, how would this effect the value of $sin\angle BAC$?

Question Four: [3, 5: 8 marks]

Consider triangle PQR where $cos \angle QPR = \frac{5}{8}$ and side PQ has length 32 m.



a) Determine the length of side RQ.

b) $Tan \angle PQR = \frac{4}{5}$, hence or otherwise, determine the area of the triangle. Explain your answer.

Question Five: [4, 5: 9 marks]

a) In triangle *ABC*, the length of side *AB* is 6cm, $\sin C = 0.6$ and $\sin B = 0.8$.

Determine the exact length of side *AC*.

b) In triangle *MNO*, the length of side *MN* is 4cm, the length of side MO is 6cm and $\cos M = \frac{2}{3}$.

Determine the exact length of side NO.

Question Six: [4 marks]

In triangle DEF, $d = 6cm$, $e = 5\ cm$ and $f = 7cm$.

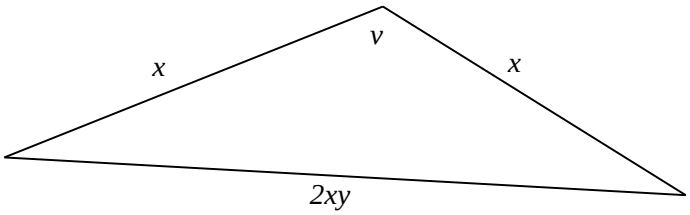
Given that the area of the triangle is $15cm^2$, determine the value of $\sin E$.

Question Seven: [4 marks]

Harry was 15m due south of Zayn. If Liam is due east of Harry and on a bearing of 158° from Zayne, calculate the distance between Harry and Liam. You may wish to use the approximation of $\tan 22 = 0.4$.

Question Eight: [4 marks]

Consider the following diagram



Show that $1 - 4y^2 = Cos\ v$

Topic: Non-Calculator Trigonometry
SOLUTIONS

Time: 45 mins Marks: /45 marks

No calculator allowed

Question One: [2, 2, 2: 6 marks]

Solve the following:

a) $0.3 = \frac{6}{x}$

$x = \frac{6}{0.3}$ ✓

$= \frac{60}{3} = 20$ ✓

b) $0.26 = \frac{y}{12}$

$12 \times 0.26 = y$ ✓

$3.12 = y$ ✓

c) $z^2 + 3^2 = 5^2$

$z^2 + 9 = 25$

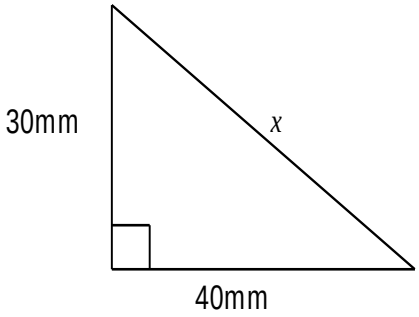
$z^2 = 16$ ✓

$z = \pm 4$ ✓

Question Two: [3, 3: 6 marks]

Calculate the length of the unknown side.

a)



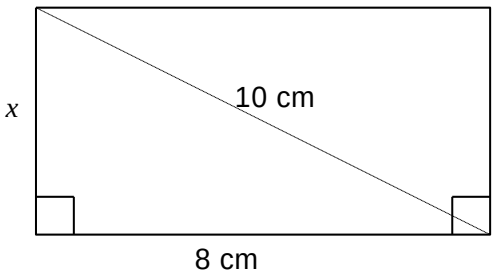
$x = \sqrt{30^2 + 40^2}$ ✓

$x = \sqrt{900 + 1600}$

$x = \sqrt{2500}$ ✓

$x = 50mm$ ✓

b)



$10^2 = x^2 + 8^2$ ✓

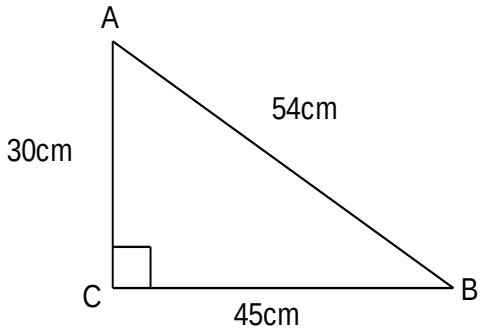
$x = \sqrt{100 - 64}$

$x = \sqrt{36}$ ✓

$x = 6cm$ ✓

Question Three: [2, 2: 4 marks]

Consider the following triangle.



a) Determine the value of $sin\angle\ BAC$.

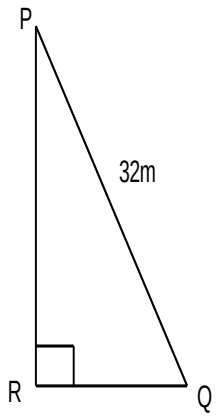
$= \frac{45}{54}$ ✓✓

b) If the lengths of the sides of the triangle were all doubled in size, how would this effect the value of $sin\angle\ BAC$? Explain your answer.

Not at all, similar triangles have the same size angles. ✓ ✓

Question Four: [3, 5: 8 marks]

Consider triangle PQR where $cos\angle\ QPR = \frac{5}{8}$ and side PQ has length 32m.



a) Determine the length of side RQ.

$cosP = \frac{x}{32}$ ✓

$\frac{5}{8} = \frac{x}{32}$ ✓

$x = 20$ m ✓

b) $Tan\angle\ PQR = \frac{4}{5}$, hence or otherwise, determine the area of the triangle.

$\frac{x}{y} = tanQ$ ✓

$\frac{20}{y} = \frac{4}{5}$ ✓

$y = 25$ ✓

$A = \frac{1}{2} \times 20 \times 25$ ✓

$= 250m^2$ ✓

Question Five: [4, 5: 9 marks]

a) In triangle *ABC*, the length of side *AB* is 6cm, $\sin C = 0.6$ and $\sin B = 0.8$.

Determine the exact length of side *AC*.

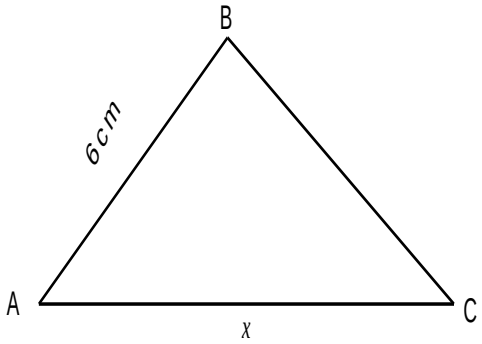
$\frac{x}{sinB} = \frac{6}{sinC}$ ✓

$\frac{x}{0.8} = \frac{6}{0.6}$ ✓

$x = \frac{6 \times 0.8}{0.6}$

$= \frac{24}{5} \times \frac{5}{3}$ ✓

$= 8cm$ ✓



b) In triangle *MNO*, the length of side *MN* is 4cm, the length of side MO is 6cm and $\cos M = \frac{2}{3}$.

Determine the exact length of side NO.

$x^2 = 4^2 + 6^2 - 2(4)(6) \times \frac{2}{3}$ ✓

$x^2 = 16 + 36 - 48 \times \frac{2}{3}$ ✓

$x^2 = 52 - 32$ ✓

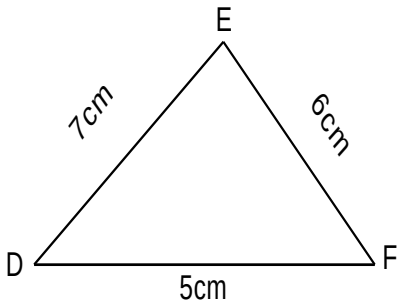
$x^2 = 20$ ✓

$x = \sqrt{20}$ ✓

Question Six: [4 marks]

In triangle DEF, $d = 6cm$, $e = 5cm$ and $f = 7cm$.

Given that the area of the triangle is $15cm^2$, determine the value of $\sin E$.



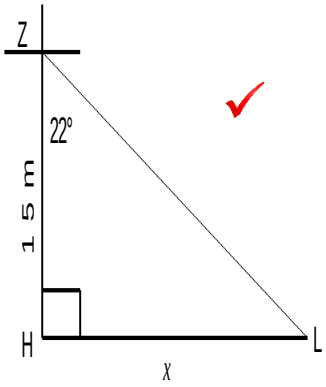
$$15 = \frac{1}{2} \times 7 \times 6 \times sinE$$

$$\frac{30}{42} = sinE$$

$$sinE = \frac{5}{7}$$

Question Seven: [4 marks]

Harry was 15m due south of Zayn. If Liam is due east of Harry and on a bearing of 158° from Zayne, calculate the distance between Harry and Liam. You may wish to use the approximation of $\tan 22 = 0.4$.



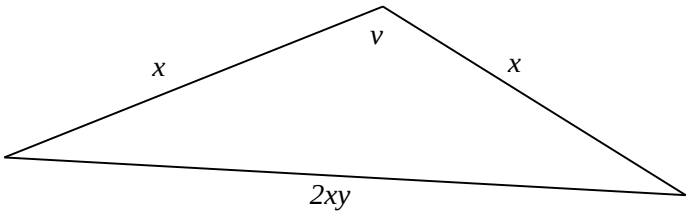
$$tan22° = \frac{x}{15}$$

$$\frac{2}{5} = \frac{x}{15}$$

$$x \approx 6m$$

Question Eight: [4 marks]

Consider the following diagram



Show that $1 - 4y^2 = Cos\ v$

$$Cos\ v = \frac{x^2 + x^2 - 2(2xy)^2}{2x^2}$$ ✓

$$Cos\ v = \frac{2x^2 - 2(4x^2y^2)}{2x^2}$$ ✓

$$Cos\ v = \frac{2x^2 - 8x^2y^2}{2x^2}$$

$$Cos\ v = \frac{2x^2(1 - 4y^2)}{2x^2}$$ ✓

$$Cos\ v = 1 - 4y^2$$ ✓