

Higher week 9 Answers 1GCSE

1/a, $\frac{c}{\sin 42} = \frac{8}{\sin 57}$ $c = \frac{8 \times \sin 42}{\sin 57} = 6.38 \text{ m}$ b, $x = \frac{\sin(63) \times 5}{\sin 67} = 4.84 \text{ cm}$

c, to find x need angle opposite 6.2 m $(180 - (102 + 42)) = 36^\circ$
 $x = \frac{\sin(102) \times 6.2}{\sin 36} = 10.3 \text{ m}$

2/a, $\frac{\sin x}{3.2} = \frac{\sin 67}{6} \Rightarrow x = \sin^{-1} \left[\frac{3.2 \times \sin 67}{6} \right] = 29.4^\circ$ b, $x = 53.5^\circ$

c, find 3rd angle first = 31.2° $x = 180 - (111 + 31.2) = 37.8^\circ$

3/a, $x^2 = 5^2 + 7^2 - 2 \times 5 \times 7 \times \cos 60$ b, $x = 4.12 \text{ m}$ c, $x = 28.2 \text{ cm}$
 $x^2 = 39$
 $x = 6.24 \text{ cm}$

4, Remember to rearrange equation $\Rightarrow a^2 = b^2 + c^2 - 2bc \cos A$

c, $x = \cos^{-1} \left[\frac{7^2 + 4^2 - 9^2}{2 \times 7 \times 4} \right] = 107^\circ$

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

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

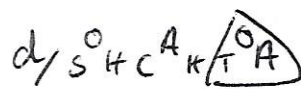
$A = \cos^{-1} \left[\frac{b^2 + c^2 - a^2}{2bc} \right]$

b, 45.6° c, 37.3°

5/a, Cos Rule $x^2 = 19^2 + 32^2 - 2 \times 19 \times 32 \times \cos 100$
 $x = 40 \text{ cm}$

b, Pythag $x = \sqrt{8^2 + 5^2} = 9.43 \text{ m}$

c, Sine Rule $x = \frac{\sin(51) \times 11}{\sin(95)} = 8.58$



$x = \tan(32) \times 18 = 11.29 \text{ cm}$

6/a, Sine Rule $x = \sin^{-1} \frac{15}{17} = 61.9^\circ$

b, Sine Rule $x = \sin^{-1} \left(\frac{7 \times \sin 96}{12} \right) = 35.5^\circ$

c, Cosine $x = \cos^{-1} \left(\frac{9 \cdot 6^2 + 9 \cdot 6^2 - 7^2}{2 \times 9 \cdot 6 \cdot 9 \cdot 6} \right) = 24^\circ$

d, find PRQ first using Sine $QRP = \frac{7 \times \sin 128}{12} = 27.4^\circ$
 $\angle RPQ = 180 - 128 - 27.4 = 24.6^\circ$

7/a, Area = $\frac{1}{2} \times 3 \times 5 \times \sin 80 = 7.39 \text{ cm}^2$

b, Area = $\frac{1}{2} \times 5 \times 12 \times \sin 97 = 29.8 \text{ cm}^2$

c, Area = $\frac{1}{2} \times 6.5 \times 3 \times \sin 34 = 5.45 \text{ cm}^2$

8/a, $\frac{1}{2} \times 9 \times x \times \sin 63 = 32.1$
 $x = \frac{32.1 \times 2}{9 \times \sin 63} = 8 \text{ cm}$

b, $\frac{1}{2} \times 2.3 \times 3.7 \times \sin x = 4.16$
 $x = \sin^{-1} \left(\frac{4.16 \times 2}{2.3 \times 3.7} \right) = 77.9^\circ$

$$8/c) \frac{1}{2} \times x^2 \times \sin 32 = 41.4$$

$$x^2 = \frac{41.4 \times 2}{\sin 32}$$

$$x = 12.5 \text{ cm}$$

$$d) \frac{1}{2} \times 15 \times 17 \times \sin x = 78.5$$

$$x = \sin^{-1} \left[\frac{78.5 \times 2}{15 \times 17} \right]$$

$$x = 38^\circ$$

9)  South East means 135°

70
45
58

Bearing of B from C measured from North

a) Start by finding side CB Cosine rule $a^2 = b^2 + c^2 - 2bc \cos A$

$$a^2 = 58^2 + 70^2 - 2 \times 58 \times 70 \times \cos 45$$

$$BC = a = 50.2 \text{ km}$$

b) * Bearing is angle ACB Sine Rule $\sin C = \frac{58 \times \sin 45}{50.2}$

$$C = 54.8^\circ$$

Bearing of B from C is 055°

$$10) x^2 = 5.2^2 + 6.7^2 - 2 \times 5.2 \times 6.7 \times \cos 117$$

$$x^2 = 103.6 \quad x = 10.2 \text{ cm}$$

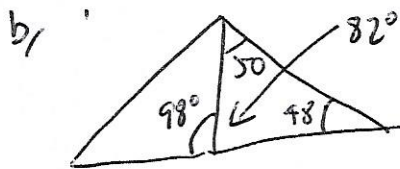
11) AC using Sine Rule ① find angle ABC = 18°

$$\textcircled{2} \frac{AC}{\sin 18} = \frac{10.2}{\sin 134}$$

$$AC = 4.38 \text{ cm}$$

$$12) a) \frac{BD}{\sin 48} = \frac{6}{\sin 50}$$

$$BD = 5.82 \text{ cm}$$



$$AD^2 = 8^2 + 5.82^2 - 2 \times 8 \times 5.82 \times \cos 98$$

$$AD = 10.5 \text{ cm}$$

$$c) \text{ Area of ABD} = \frac{1}{2} \times 8 \times 5.82 \times \sin 98 = 23.1 \text{ cm}^2$$

13) To find area start by finding angle CAB

$$\frac{\sin A}{8.9} = \frac{\sin 32}{13.2}$$

$$A = \sin^{-1} \left[\frac{8.9 \times \sin 32}{13.2} \right] = 20.9^\circ$$

∴ angle CBA =

$$180 - (32 + 20.9) = 127.1^\circ$$

$$\text{Area} = \frac{1}{2} \times 8.9 \times 13.2 \times \sin 127.1^\circ$$

$$= 46.9 \text{ cm}^2$$

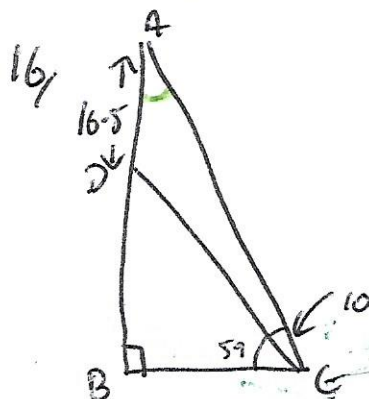
14/ ① Start with finding angle BAC using Area $\frac{1}{2} \times 8 \times 10 \times \sin A = 25$
 $A = \sin^{-1} \left[\frac{25 \times 2}{8 \times 10} \right]$

② Find length BC $a^2 = 8^2 + 10^2 - 2 \times 8 \times 10 \times \cos 39.7 = 38.7$
 $a = 6.26$

∴ Perimeter = $6.26 + 10 + 8 = 24.3 \text{ cm}$



Cosine Rule $x = \cos^{-1} \left[\frac{5^2 + 6^2 - 8^2}{2 \times 5 \times 6} \right] = 92.9^\circ$



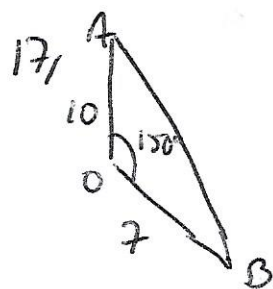
① Angle BAC = $180 - 90 - 69 = 21^\circ$

② length DL $\frac{a}{\sin 21} = \frac{16.5}{\sin 10}$ $a = 34.1 \text{ m}$

③ length DB $\sin 59 \times 34.1 = 29.2 \text{ m}$

④ length AB = $DB + DA = 29.2 + 16.5 = 45.7 \text{ m}$

Various different ways this is just one of them



$360 \div 12 = 30^\circ$
 $5 \times 30 = 150^\circ$

Cosine Rule

$AB^2 = 10^2 + 7^2 - 2 \times 10 \times 7 \times \cos 150$

$AB^2 = 270$ $AB = 16.4 \text{ cm}$

18/ Area of Sector = $\frac{72}{360} \times \pi \times 5.4^2 = 18.3 \text{ cm}^2$

Area of triangle = $\frac{1}{2} \times 5.4^2 \times \sin 72 = 13.8 \text{ cm}^2$

Shaded = $18.3 - 13.8 = 4.43 \text{ cm}^2$