Trigonometric ratios

Solutions Main Menu

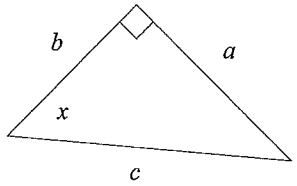
46 What is the value of $\sin x$ in the triangle below?

(A) $\frac{b}{c}$

(B) $\frac{a}{b}$

(C) $\frac{b}{a}$

(D) $\frac{a}{c}$



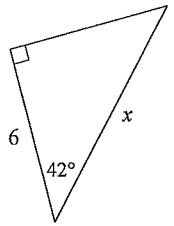
47 What is the value of x in the diagram?

(A) $6\cos 42^\circ$

(B) $\frac{6}{\cos 42^\circ}$

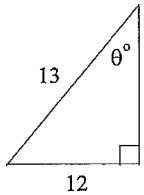
(C) $6\sin 42^\circ$

(D) $\frac{6}{\sin 42^\circ}$



Not to scale

48 Hannah correctly calculated the size of angle θ using trigonometry.



Not to scale

What was her first line of working?

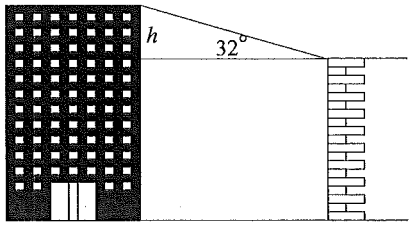
(A) $\cos\theta = \frac{12}{13}$

(B) $\cos\theta = \frac{13}{12}$

(C) $\sin\theta = \frac{12}{13}$

(D) $\sin\theta = \frac{13}{12}$

49 The two buildings below are standing on level ground. The horizontal distance between the buildings is 18.5 metres and the angle of elevation between the buildings is 32°.



Not to scale

What the difference in height (h) between the buildings?

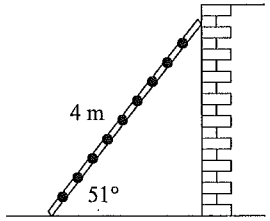
(A) 9.8 m

(B) 11.6 m

(C) 15.7 m

(D) 29.6 m

50 A four metre ladder reaches up a vertical wall making an angle of 51° with the ground.



Not to scale

How far is the foot of the ladder from the wall?

(A) 2.5 m

(B) 3.1 m

(C) 5.1 m

(D) 6.4m

51 A woman is standing on level ground 70 metres from the base of a vertical cliff. The angle of elevation to the top of the cliff is 40°. Allowing for the fact that the woman is 1.8 metres tall, what is the height of the cliff?

(A) 58 metres
(B) 59 metres
(C) 60 metres
(D) 61 metres

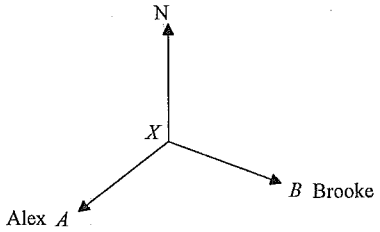
52 What is solution to the equation $2\cos\beta = -\sqrt{3}$ for $0^\circ \le \beta \le 360^\circ$?

(A) $\beta = 30^\circ$ or 330°
(B) $\beta = 60^\circ$ or 300°
(C) $\beta = 150^\circ$ or 210°
(D) $\beta = 120^\circ$ or 240°

53 What is solution to the equation $\cos(\frac{\theta}{2} + 20^\circ) = \sin\theta$ for $0^\circ \le \theta \le 90^\circ$?

(A) $\theta = 20^\circ$
(B) $\theta = 40^\circ$
(C) $\theta = \frac{160^\circ}{3}$
(D) $\theta = \frac{140^\circ}{3}$

54 Alex leaves point X and walks on a bearing of 230°.
Brooke leaves point X and walks on a bearing of S70°E.



Not to scale

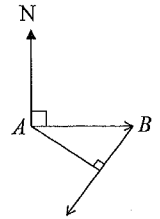
What is the angle AXB?

(A) 50°
(B) 120°
(C) 160°
(D) 300°

55 A point A is 6 km south-west of a point O and a point B is 9 km on a bearing of 140° from O. What is the size of $\angle AOB$?

(A) 75°
(B) 85°
(C) 95°
(D) 105°

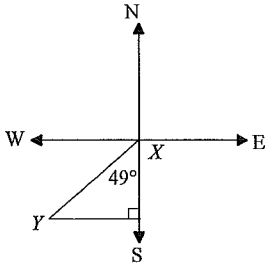
56 A sailing boat travels due east from A to B. It then turns and sails on a bearing of 210°. What is the boat's bearing from A when the boat is closest to A?



(A) 030°
(B) 120°
(C) 150°
(D) 210°

57 The compass bearing of Y from X is S49°W.

What is the compass bearing of X from Y?

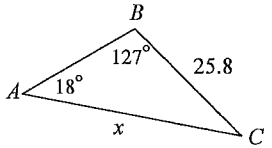


(A) S49°W
(B) S41°W
(C) N49°E
(D) N41°E

58 Three markers are placed out to sea. Marker B is 4 km north of marker A. However to sail from A to B a boat must first sail from A to C on a bearing 025° and then turn and sail from C to B on a bearing of 335°. What is the distance from A to C?

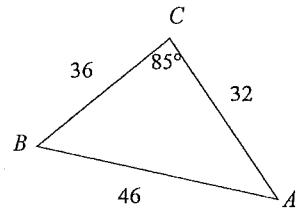
(A) 2.2 km
(B) 4.0 km
(C) 6.3 km
(D) 28.1 km

59 What is the approximate length of the side marked with the letter x?



(A) 10
(B) 31
(C) 39
(D) 67

60 Which formula describes how to calculate the size of angle ABC?



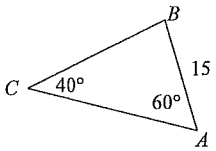
(A) $\sin B = \dfrac{32\sin 85}{46}$

(B) $\sin B = \dfrac{36\sin 85}{32}$

(C) $\sin B = \dfrac{36\sin 85}{46}$

(D) $\sin B = \dfrac{42\sin 85}{32}$

61 What is the correct expression for AC in triangle ABC?



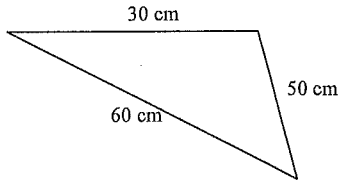
(A) $\dfrac{15\sin 80^\circ}{\sin 40^\circ}$

(B) $\dfrac{15\sin 80^\circ}{\sin 60^\circ}$

(C) $\dfrac{15\sin 40^\circ}{\sin 60^\circ}$

(D) $\dfrac{\sin 40^\circ}{15\sin 80^\circ}$

62 The following triangle has sides 30 cm, 50 cm and 60 cm.



Angle C is the largest angle. Which of the following expressions is correct for angle C?

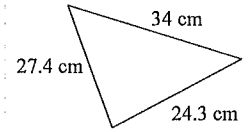
(A) $\text{Cos C} = \dfrac{30^2 + 60^2 - 50^2}{2\times 30\times 60}$

(B) $\text{Cos C} = \dfrac{50^2 + 30^2 - 60^2}{2\times 50\times 30}$

(C) $\text{Cos C} = \dfrac{50^2 + 60^2 - 30^2}{2\times 50\times 60}$

(D) $\text{Cos C} = \dfrac{50^2 + 30^2 - 60^2}{2\times 50\times 60}$

63 The smallest angle in the triangle below is θ.



What is the value of θ to the nearest degree?

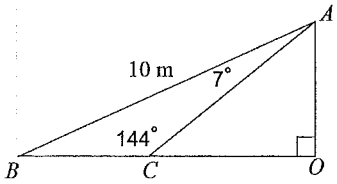
(A) 30°

(B) 45°

(C) 53°

(D) 82°

64



Not to scale

Which trignometric formula would be most useful in calculating the length of side BC?

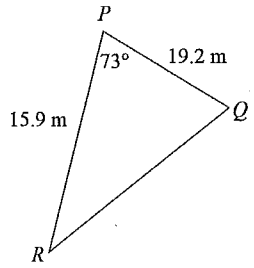
(A) $c^2 = a^2 + b^2 - 2ab\ \text{Cos C}$

(B) $\text{A} = \dfrac{1}{2}\ a\ b\ \text{Sin C}$

(C) $\text{Cos C} = \dfrac{a^2 + b^2 - c^2}{2ab}$

(D) $\dfrac{a}{\text{Sin A}} = \dfrac{b}{\text{Sin B}} = \dfrac{c}{\text{Sin C}}$

65 What is the area of triangle PQR to the nearest square metre?



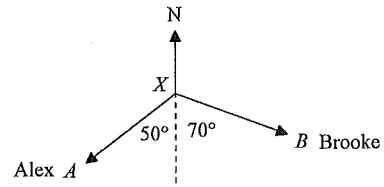
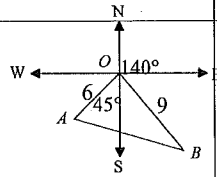
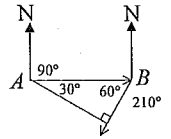
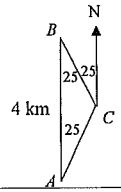
(A) 141 m^2

(B) 146 m^2

(C) 283 m^2

(D) 296 m^2

Trigonometric ratios		Main Menu
	Solution	**Criteria**
46	$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}} = \frac{a}{c}$	1 Mark: D
47	$\cos 42^\circ = \frac{6}{x}$ $x = \frac{6}{\cos 42^\circ}$	1 Mark: B
48	$\sin\theta = \frac{\text{Opposite side}}{\text{Hypotenuse}} = \frac{12}{13}$	1 Mark: C
49	$\tan 32^\circ = \frac{h}{18.5}$ $h = 18.5 \times \tan 32^\circ$ $= 11.56008301 \approx 11.6$ m	1 Mark: B
50	$\cos 51 = \frac{x}{4}$ $x = \cos 51 \times 4$ $= 2.517281564...$ $= 2.5$ m (correct to 1 decimal place)	1 Mark: A
51	$\tan 40 = \frac{x}{70}$ $x = 70 \tan 40$ $= 58.73697418....$ Height of the cliff is 1.8 + 58.736...= 60.536... or 61 metres	1 Mark: D
52	$2\cos\beta = -\sqrt{3}$ $\cos\beta = -\frac{\sqrt{3}}{2}$ $\beta = 150^\circ$ or 210°	1 Mark: C
53	Sine and Cosine are complementary angles $\sin\theta = \cos(90-\theta)$ $\cos(\frac{\theta}{2}+20^\circ) = \cos(90^\circ-\theta)$ $\frac{\theta}{2}+20^\circ = 90^\circ-\theta$ $\theta+40^\circ = 180^\circ-2\theta$ $3\theta = 140^\circ$ $\theta = \frac{140^\circ}{3}$	1 Mark: D

54	 $\angle AXB = 50^\circ + 70^\circ = 120^\circ$	1 Mark: B
55	$\angle BOS = 180 - 140$ (angle OB with NS) $= 40$ $\angle AOB = 45 + 40$ $= 85$ 	1 Mark: B
56	 Bearing $= 90^\circ + 30^\circ$ $= 120^\circ$	1 Mark: B
57	N49°E	1 Mark: C
58	$\frac{AC}{\sin 25} = \frac{4}{\sin 130}$ $AC = \frac{4\sin 25}{\sin 130}$ $= 2.206755838...$ ≈ 2.2 km 	1 Mark: A
59	$\frac{x}{\sin 127^\circ} = \frac{25.8}{\sin 18^\circ}$ $x = \frac{25.8 \times \sin 127^\circ}{\sin 18^\circ}$ $= 66.67852103...$	1 Mark: D
60	$\frac{\sin B}{32} = \frac{\sin 85}{46}$ $\sin B = \frac{32\sin 85}{46}$	1 Mark: A
61	$\frac{AC}{\sin 80^\circ} = \frac{15}{\sin 40^\circ}$ $AC = \frac{15\sin 80^\circ}{\sin 40^\circ}$	1 Mark: A

62	Largest angle is opposite the longest side (60 cm) Cosine rule $\text{Cos C} = \frac{50^2 + 30^2 - 60^2}{2 \times 50 \times 30}$	1 Mark: B
63	$\cos\theta = \frac{34^2 + 27.4^2 - 24.3^2}{2 \times 34 \times 27.4}$ $\theta = 45^\circ$	1 Mark: B
64	In triangle ABC we are given two sides (BC and 10m) and two opposite angles (7° and 144°). This information requires the Sine rule.	1 Mark: D
65	$A = \frac{1}{2}ab\sin C$ $= \frac{1}{2} \times 15.9 \times 19.2 \times \sin 73$ $= 145.970358...$ $\approx 146 \text{ m}^2$	1 Mark: B