

Fully-worked Solutions

Practice 5

Formative Practice

- 1 A Wrong
B Wrong
C Correct
D Wrong

Answer: C

2 $\sin \theta = \frac{2}{5}$

$$\frac{16}{x} = \frac{2}{5}$$

$$2x = 80$$

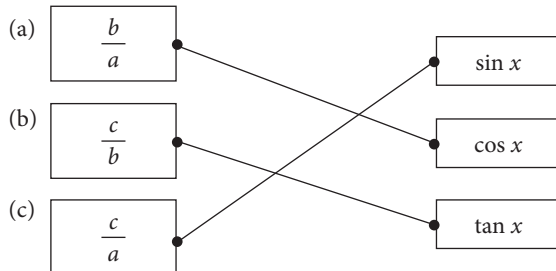
$$x = 40$$

Answer: D

3

Triangle	Opposite side	Adjacent side
(a) PQR	PQ	QR
(b) PRS	PR	PS

4



5 (a) (i) $\frac{BE}{AE} = \frac{CF}{AF} = \frac{DG}{AG}$

(ii) $\frac{AB}{AE} = \frac{AC}{AF} = \frac{AD}{AG}$

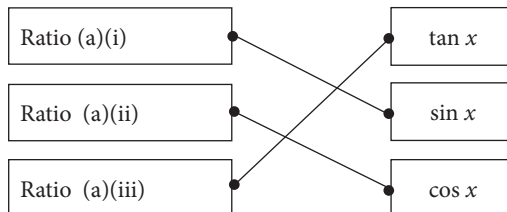
(iii) $\frac{BE}{AB} = \frac{CF}{AC} = \frac{DG}{AD}$

(b) (i) The ratio of the opposite side to the hypotenuse of angle x remains the same even though the size of triangle varies.

(ii) The ratio of the adjacent side to the hypotenuse of angle x remains the same even though the size of triangle varies.

(iii) The ratio of the opposite side to the adjacent side of angle x remains the same even though the size of triangle varies.

(c)



6

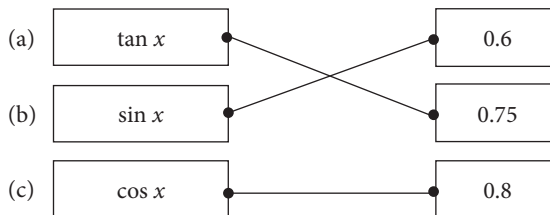
Triangle	$\frac{\text{Opposite side}}{\text{Hypotenuse}}$	$\frac{\text{Adjacent side}}{\text{Hypotenuse}}$	$\frac{\text{Opposite side}}{\text{Adjacent side}}$
ABC	$\frac{2}{7.2} = 0.278$	$\frac{7}{7.2} = 0.972$	$\frac{2}{7} = 0.286$
ABD	$\frac{4}{8.1} = 0.494$	$\frac{7}{8.1} = 0.864$	$\frac{4}{7} = 0.571$
ABE	$\frac{6}{9.1} = 0.659$	$\frac{7}{9.1} = 0.769$	$\frac{6}{7} = 0.857$

(b) (i) The value of sine increases with the size of angle. True

(ii) The value of cosine decreases with the size of angle. False

(iii) The value of tangent increases when the size of angle decreases. False

7



8 $PQ^2 = 65^2 - 25^2$

$$= 3\,600$$

$$PQ = 60 \text{ cm}$$

$$\cos \theta = \frac{60}{65}$$

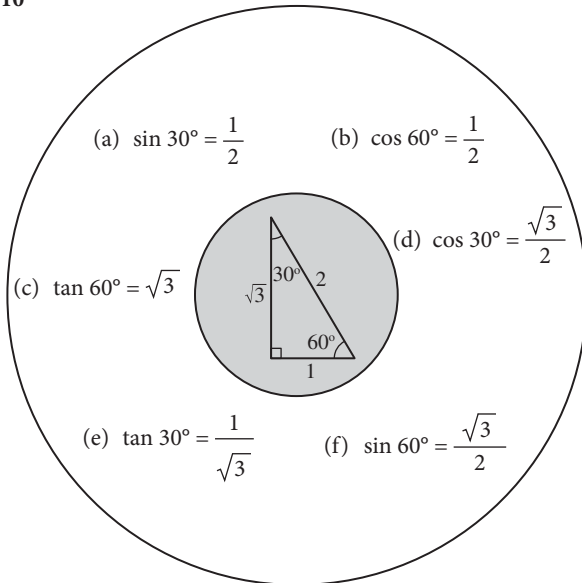
$$= \frac{12}{13}$$

9 (a) $PQ^2 = 15^2 - 10^2$
 $= 225 - 100$
 $PQ = 11.18 \text{ cm}$

(b) $\tan \theta = \frac{11.18}{10}$
 $= 1.118$

(c) $\sin \theta = \frac{11.18}{15}$
 $= 0.7453$

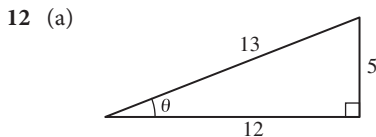
10



11 (a) $\frac{LM}{20} = \frac{7}{10}$
 $LM = \frac{7}{10} \times 20$
 $= 14 \text{ cm}$

(b) $\frac{PQ}{8} = 1.4$
 $PQ = 1.4 \times 8$
 $= 11.2 \text{ cm}$

(c) $\frac{35}{AC} = \frac{7}{8}$
 $AC = \frac{8}{7} \times 35$
 $= 40 \text{ cm}$



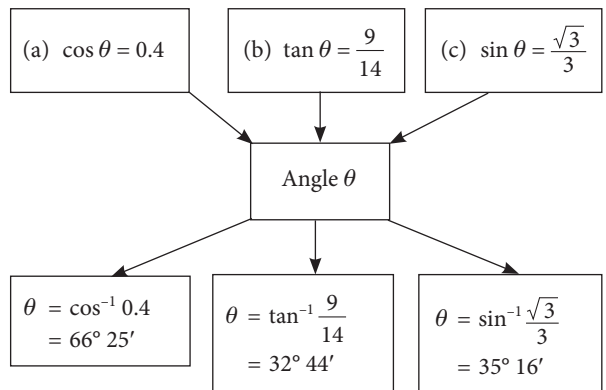
(b) (i) $\sin \theta = \frac{5}{13}$

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

13 (a) $\sin x = \frac{2}{3}$
 $\frac{12}{BC} = \frac{2}{3}$
 $2BC = 36$
 $BC = 18 \text{ cm}$ [✓]

(b) $BC = 3BE$
 $18 = 3BE$
 $BE = 6 \text{ cm}$
 $DE^2 = 10^2 - 6^2$
 $= 100 - 36$
 $= 64$
 $DE = 8 \text{ cm}$
 $\tan y = \frac{8}{6}$
 $= \frac{4}{3}$ [✗]

14



15 $\cos \angle PRQ = \frac{4.8}{9.6}$
 $= \frac{1}{2}$
 $\angle PRQ = 60^\circ$

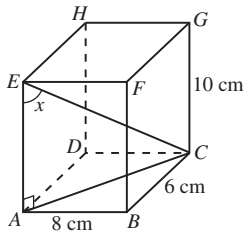
Answer: D

16 (a) $RS^2 = 8^2 + 6^2$
 $= 64 + 36$
 $= 100$
 $RS = 10 \text{ cm}$
 $\cos y = \frac{6}{10}$
 $= \frac{3}{5}$ [✗]

(b) $\sin x = \frac{5}{13}$
 $\frac{MQ}{13} = \frac{5}{13}$
 $MQ = 5 \text{ cm}$
 $MP^2 = 13^2 - 5^2$
 $= 169 - 25$
 $= 144$
 $MP = 12 \text{ cm}$

$$\begin{aligned}
 MR &= 5 \text{ cm} \\
 PR &= 12 \text{ cm} - 5 \text{ cm} \\
 &= 7 \text{ cm} \quad [\checkmark]
 \end{aligned}$$

17



$$\begin{aligned}
 AC^2 &= 8^2 + 6^2 \\
 &= 64 + 36 \\
 &= 100
 \end{aligned}$$

$$AC = 10 \text{ cm}$$

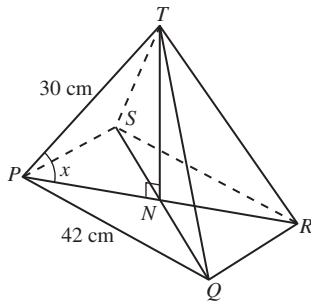
$$\tan x = \frac{AC}{AE}$$

$$= \frac{10}{10}$$

$$= 1$$

$$x = 45^\circ$$

18

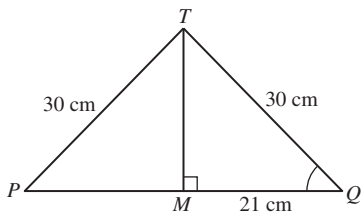


$$(a) \sin x = \frac{11}{15}$$

$$\frac{NT}{30} = \frac{11}{15}$$

$$\begin{aligned}
 NT &= \frac{11}{15} \times 30 \\
 &= 22 \text{ cm}
 \end{aligned}$$

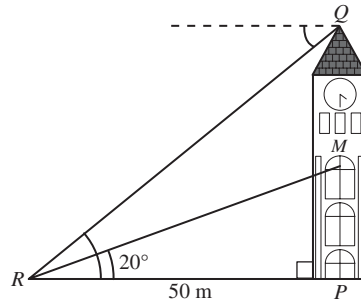
(b)



$$\begin{aligned}
 \cos \angle PQT &= \frac{21}{30} \\
 &= 0.7
 \end{aligned}$$

$$\begin{aligned}
 \angle PQT &= \cos^{-1} 0.7 \\
 &= 45^\circ 34'
 \end{aligned}$$

19



$$(a) \frac{PM}{50} = \tan 20^\circ$$

$$\begin{aligned}
 PM &= 50 \times \tan 20^\circ \\
 &= 18.2 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 PQ &= 2 \times 18.2 \text{ m} \\
 &= 36.4 \text{ m}
 \end{aligned}$$

The height of the tower is 36.4 m.

$$(b) \tan \angle PRQ = \frac{36.4}{50}$$

$$= 0.728$$

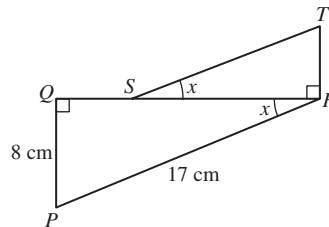
$$\angle PRQ = \tan^{-1} 0.728$$

$$= 36^\circ 3'$$

The angle of depression of R from Q is $36^\circ 3'$.

Summative Practice

1



$$\sin x = \frac{8}{17}$$

$$PR = 17 \text{ cm}$$

$$QR^2 = 17^2 - 8^2$$

$$= 289 - 64$$

$$= 225$$

$$QR = 15 \text{ cm}$$

$$RS = 15 \text{ cm} - 3 \text{ cm}$$

$$= 12 \text{ cm}$$

$$\tan x = \frac{8}{15}$$

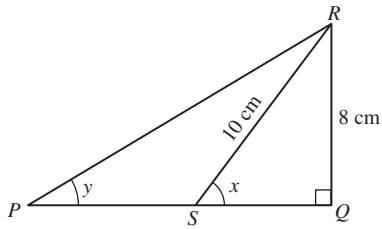
$$\frac{RT}{12} = \frac{8}{15}$$

$$RT = \frac{8}{15} \times 12$$

$$= 6.4 \text{ cm}$$

Answer: B

2



$$\begin{aligned} QS^2 &= 10^2 - 8^2 \\ &= 100 - 64 \\ &= 36 \end{aligned}$$

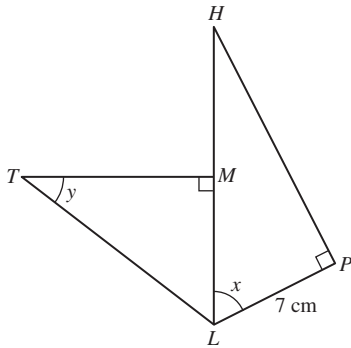
$$QS = 6 \text{ cm}$$

$$PQ = 12 \text{ cm}$$

$$\begin{aligned} \tan x - \tan y &= \frac{8}{6} - \frac{8}{12} \\ &= \frac{8}{12} \\ &= \frac{2}{3} \end{aligned}$$

Answer: B

3



$$\cos x = \frac{7}{25}$$

$$\frac{7}{HL} = \frac{7}{25}$$

$$HL = 2.5 \text{ cm}$$

$$LM = \frac{1}{2} \times 25 \text{ cm}$$

$$= 12.5 \text{ cm}$$

$$\sin y = \frac{5}{8}$$

$$\frac{12.5}{LT} = \frac{5}{8}$$

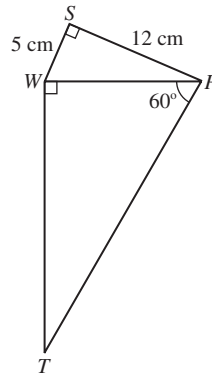
$$5LT = 12.5 \times 8$$

$$5LT = 100$$

$$LT = 20 \text{ cm}$$

Answer: A

4



$$\begin{aligned} PW^2 &= 12^2 + 5^2 \\ &= 144 + 25 \end{aligned}$$

$$= 169$$

$$PW = 13 \text{ cm}$$

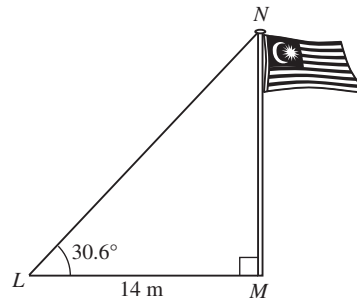
$$\cos 60^\circ = \frac{13}{PT}$$

$$\frac{1}{2} = \frac{13}{PT}$$

$$PT = 26 \text{ cm}$$

Answer: B

5



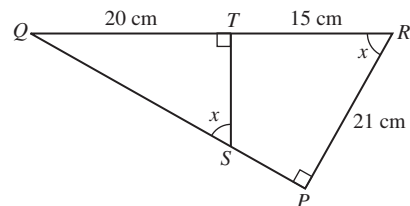
$$\frac{MN}{14} = \tan 30.6^\circ$$

$$MN = 14 \times \tan 30.6^\circ$$

$$= 8.28 \text{ m}$$

Answer: A

6



$$\begin{aligned} \text{(a) } PQ^2 &= 35^2 - 21^2 \\ &= 1225 - 441 \end{aligned}$$

$$= 784$$

$$PQ = 28 \text{ cm}$$

$$\begin{aligned}\tan x &= \frac{28}{21} \\ &= \frac{4}{3}\end{aligned}$$

(b) $QT : QR = 4 : 7$

$$\frac{QT}{QR} = \frac{4}{7}$$

$$\frac{QT}{35} = \frac{4}{7}$$

$$QT = \frac{4}{7} \times 35$$

$$= 20 \text{ cm}$$

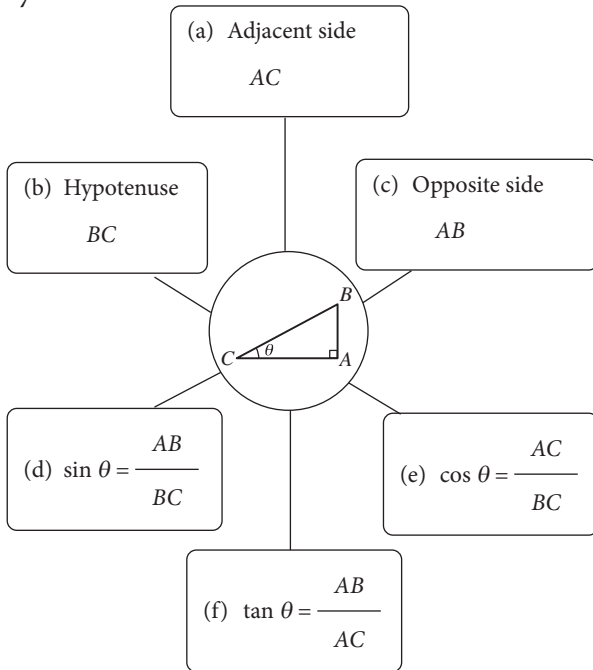
$$\tan x = \frac{4}{3}$$

$$\frac{20}{ST} = \frac{4}{3}$$

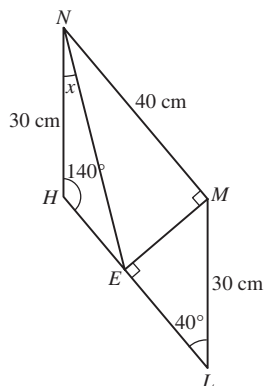
$$4ST = 60$$

$$ST = 15 \text{ cm}$$

7



8



(a) $\frac{EM}{LM} = \sin 40^\circ$

$$\frac{EM}{30} = \sin 40^\circ$$

$$EM = 30 \times \sin 40^\circ$$

$$= 19.28 \text{ cm}$$

(b) $\tan \angle ENM = \frac{19.28}{40}$

$$= 0.482$$

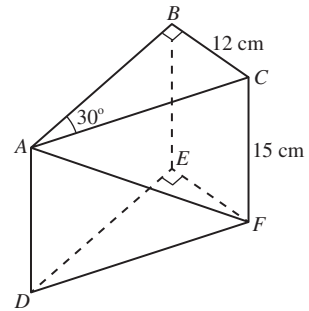
$$\angle ENM = \tan^{-1} 0.482$$

$$= 25^\circ 44'$$

$$x = 40^\circ - 25^\circ 44'$$

$$= 14^\circ 16'$$

9



(a) $\frac{12}{AC} = \sin 30^\circ$

$$\frac{12}{AC} = \frac{1}{2}$$

$$AC = 24 \text{ cm}$$

(b) $\tan \angle AFC = \frac{AC}{CF}$

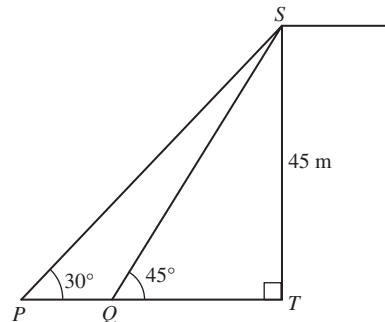
$$= \frac{24}{15}$$

$$= 1.6$$

$$\angle AFC = \tan^{-1} 1.6$$

$$= 58^\circ$$

10



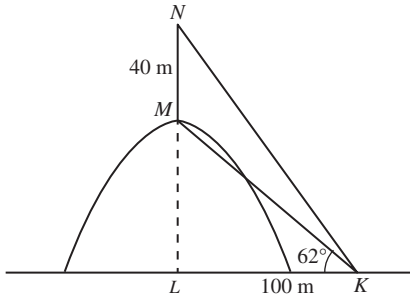
$$\frac{45}{PT} = \tan 30^\circ$$

$$PT = \frac{45}{\tan 30^\circ}$$

$$= 77.94 \text{ m}$$

$$\begin{aligned}
 QT &= 45 \text{ m} \\
 PQ &= 77.94 \text{ m} - 45 \text{ m} \\
 &= 32.9 \text{ m}
 \end{aligned}$$

11



$$\begin{aligned}
 \text{(a)} \quad \frac{LM}{100} &= \tan 62^\circ \\
 LM &= 100 \times \tan 62^\circ \\
 &= 188 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \text{(b)} \quad LN &= 188 \text{ m} + 40 \text{ m} \\
 &= 228 \text{ m}
 \end{aligned}$$

$$\begin{aligned}
 \tan \angle LKN &= \frac{228}{100} \\
 &= 2.28 \\
 \angle LKN &= \tan^{-1} 2.28 \\
 &= 66^\circ 19' \\
 \angle MKN &= 66^\circ 19' - 62^\circ \\
 &= 4^\circ 19'
 \end{aligned}$$