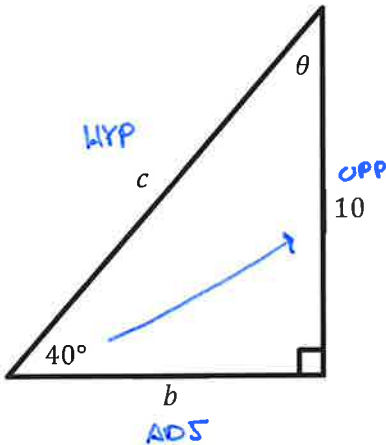


**Section 6.1b – Practice Problems**

**EMERGING LEVEL QUESTIONS**

Solve for all the missing information. Round to the nearest tenth if necessary. (Drawings are not to Scale)

1.



Angles in a  $\Delta$  add to  $180^\circ$

$$\theta = 180 - 90 - 40$$

$$\theta = 50^\circ$$

$$\tan 40^\circ = \frac{10}{b}$$

$$b \tan 40 = 10$$

$$b = \frac{10}{\tan 40} = \boxed{11.9}$$

$$b = 11.9$$

$$c = 15.6$$

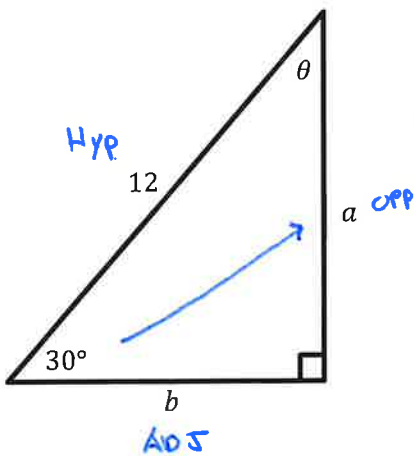
$$\theta = 50^\circ$$

$$\sin 40 = \frac{10}{c}$$

$$c \sin 40 = 10$$

$$c = \frac{10}{\sin 40} = \boxed{15.6}$$

2.



$$\theta = 180 - 90 - 30$$

$$\theta = 60^\circ$$

$$\sin 30 = \frac{a}{12}$$

$$12 \cdot \sin 30 = a$$

$$\boxed{6 = a}$$

$$b = 10.4$$

$$a = 6$$

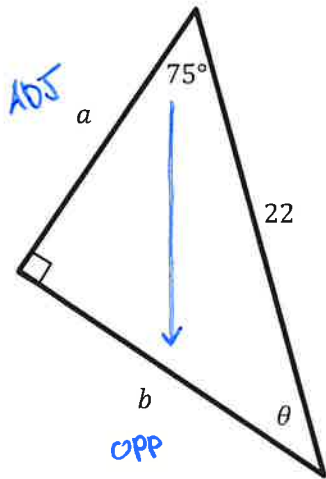
$$\theta = 60^\circ$$

$$\cos 30 = \frac{b}{12}$$

$$12 \cos 30 = b$$

$$\boxed{b = 10.4}$$

3.



$$\theta = 180 - 90 - 75 = 15^\circ$$

$$b = 21.3$$

$$a = 5.7$$

$$\theta = 15^\circ$$

$$\sin 75 = \frac{b}{22}$$

$$\cos 75 = \frac{a}{22}$$

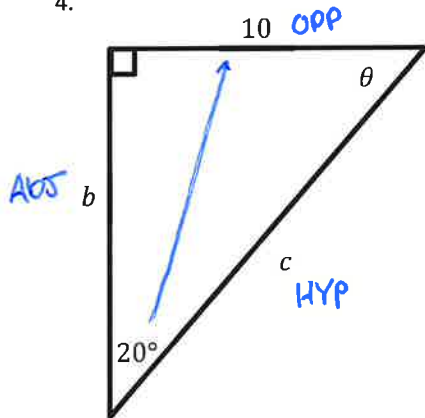
$$22 \cdot \sin 75 = b$$

$$22 \cdot \cos 75 = a$$

$$\boxed{21.3 = b}$$

$$\boxed{5.7 = a}$$

4.



$$\theta = 180 - 90 - 20 = 70^\circ$$

$$b = 27.5$$

$$c = 29.2$$

$$\theta = 70^\circ$$

$$\tan 20 = \frac{10}{b}$$

$$\sin 20 = \frac{10}{c}$$

$$b \tan 20 = 10$$

$$c \cdot \sin 20 = 10$$

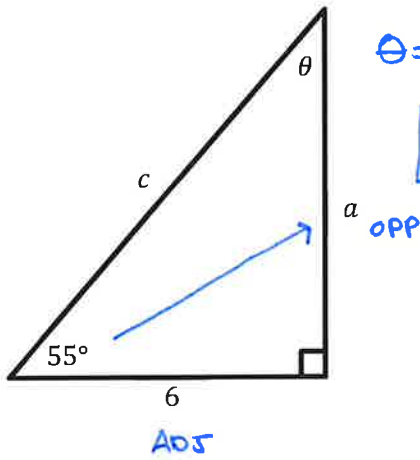
$$b = \frac{10}{\tan 20}$$

$$c = \frac{10}{\sin 20}$$

$$\boxed{b = 27.5}$$

$$\boxed{c = 29.2}$$

5.



$$\theta = 180 - 90 - 55$$

$$\theta = 35^\circ$$

$$\tan 55 = \frac{a}{6}$$

$$6 \cdot \tan 55 = a$$

$$8.6 = a$$

$$a = 8.6$$

$$c = 10.5$$

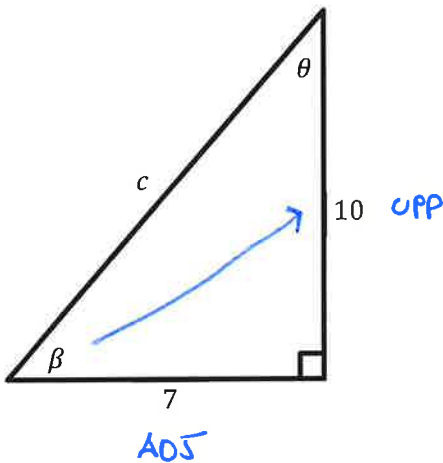
$$\theta = 35^\circ$$

$$\cos 55 = \frac{6}{c}$$

$$c \cdot \cos 55 = 6$$

$$c = \frac{6}{\cos 55} = 10.5$$

6.



could use  
Pythagorean Theorem  
for  $c$

$$\beta = 55^\circ$$

$$c = 12.2$$

$$\theta = 35^\circ$$

$$\tan \beta = \frac{10}{7}$$

$$\tan \beta = 1.4286$$

$$\beta = \tan^{-1}(1.4286)$$

$$\beta = 55^\circ$$

$$\theta = 180 - 90 - 55$$

$$= 35^\circ$$

$$\cos 55 = \frac{7}{c}$$

$$c \cdot \cos 55 = 7$$

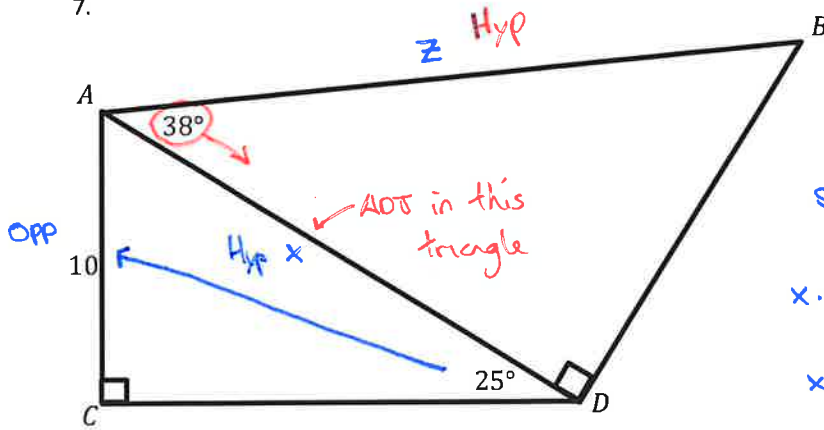
$$c = \frac{7}{\cos 55}$$

$$c = 12.2$$

PROFICIENT LEVEL QUESTIONS

Find the length of side AB

7.



$$\sin 25 = \frac{10}{x}$$

$$x \cdot \sin 25 = 10$$

$$x = \frac{10}{\sin 25}$$

$$\cos 38 = \frac{23.7}{z}$$

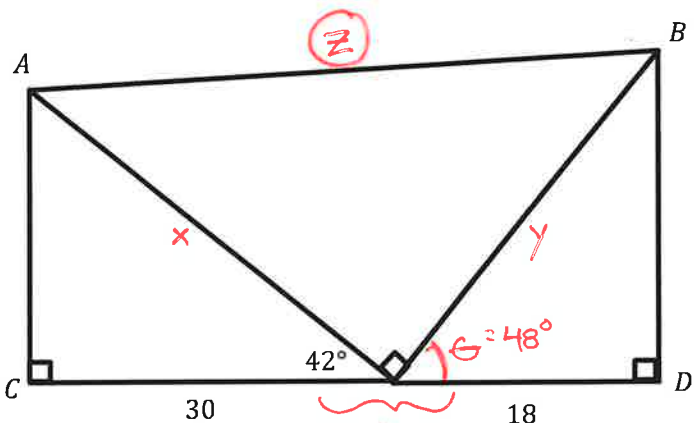
$$z \cdot \cos 38 = 23.7$$

$$z = \frac{23.7}{\cos 38}$$

$$x = 23.7$$

$$z = 30.0$$

8.



$$\cos 48 = \frac{18}{y}$$

$$y \cdot \cos 48 = 18$$

$$y = \frac{18}{\cos 48} = 26.9$$

$$\cos 42 = \frac{30}{x}$$

$$x \cdot \cos 42 = 30$$

$$x = \frac{30}{\cos 42} = 40.4$$

Pythagorean Theorem

$$z^2 = x^2 + y^2$$

$$z^2 = (40.4)^2 + (26.9)^2$$

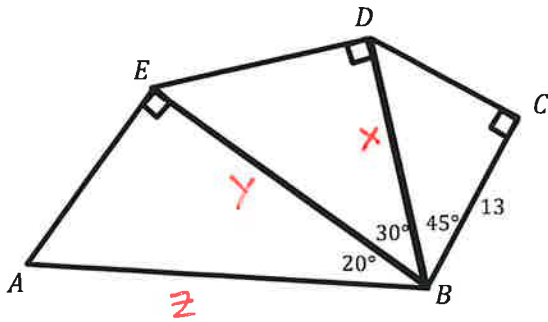
$$z^2 = 1632.16 + 723.61$$

13

$$z^2 = 2355.77$$

$$z = 48.5$$

9.



$$\cos 45 = \frac{13}{x}$$

$$\cos 30 = \frac{18.4}{y}$$

$$x = \frac{13}{\cos 45}$$

$$y = \frac{18.4}{\cos 30}$$

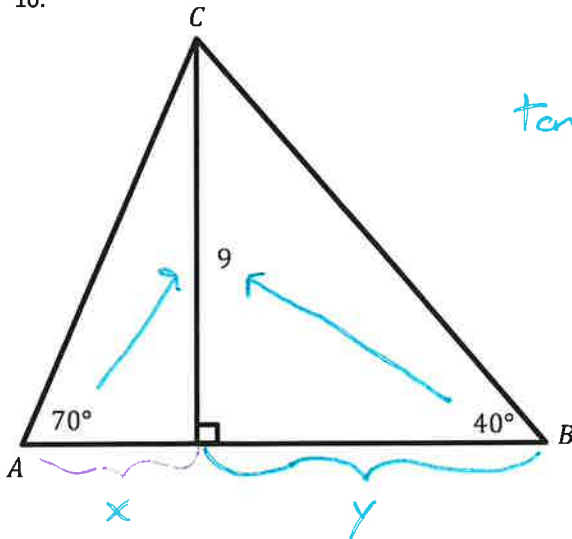
$$x = 18.4$$

$$y = 21.2$$

$$\cos 20 = \frac{21.2}{z}$$

$$z = \frac{21.2}{\cos 20} = \boxed{22.6}$$

10.



$$\tan 70 = \frac{9}{x}$$

$$\tan 40 = \frac{9}{y}$$

$$x = \frac{9}{\tan 70}$$

$$y = \frac{9}{\tan 40}$$

$$x = 3.3$$

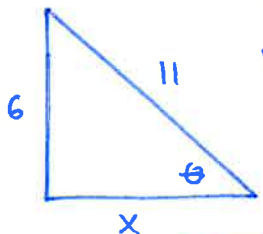
$$y = 10.7$$

$$x + y = 3.3 + 10.7$$

$$\boxed{AB = 14}$$

Find the exact value of the remaining trigonometric functions of the acute angle  $\theta$ .

11.  $\sin \theta = \frac{6}{11}$  OPP  
HYP



$$11^2 - 6^2 = x^2$$

$$121 - 36 = x^2$$

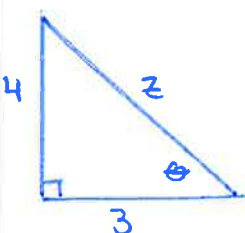
$$85 = x^2$$

$$\sqrt{85} = x$$

$\cos \theta = \frac{\sqrt{85}}{11}$

$\tan \theta = \frac{6}{\sqrt{85}}$

12.  $\tan \theta = \frac{4}{3}$  OPP  
ADJ



$$3^2 + 4^2 = z^2$$

$$9 + 16 = z^2$$

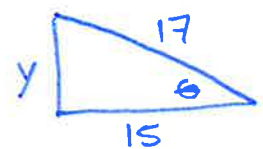
$$25 = z^2$$

$$5 = z$$

$\sin \theta = \frac{4}{5}$

$\cos \theta = \frac{3}{5}$

13.  $\cos \theta = \frac{15}{17}$  ADJ  
HYP



$$17^2 - 15^2 = y^2$$

$$289 - 225 = y^2$$

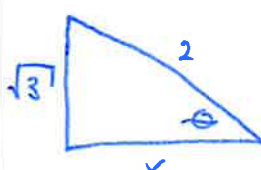
$$64 = y^2$$

$$8 = y$$

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

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

14.  $\sin \theta = \frac{\sqrt{3}}{2}$



$$2^2 - (\sqrt{3})^2 = x^2$$

$$4 - 3 = x^2$$

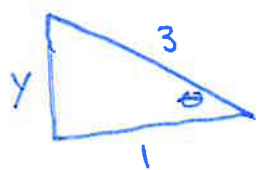
$$1 = x^2$$

$$x = 1$$

$\tan \theta = \sqrt{3}$

$\cos \theta = \frac{1}{2}$

15.  $\cos \theta = \frac{1}{3}$  ADJ  
HYP



$$3^2 - 1^2 = y^2$$

$$9 - 1 = y^2$$

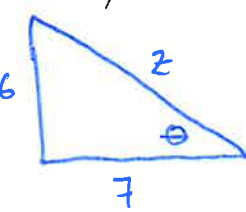
$$8 = y^2$$

$$\sqrt{8} = y$$

$\sin \theta = \frac{\sqrt{8}}{3}$

$\tan \theta = \sqrt{8}$

16.  $\tan \theta = \frac{6}{7}$



$$z^2 = 6^2 + 7^2$$

$$z^2 = 36 + 49$$

$$z^2 = 85$$

$$z = \sqrt{85}$$

$\sin \theta = \frac{6}{\sqrt{85}}$

$\cos \theta = \frac{7}{\sqrt{85}}$

17.  $\sin \theta = \frac{3}{7}$



$$7^2 - 3^2 = x^2$$

$$49 - 9 = x^2$$

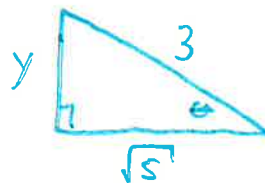
$$40 = x^2$$

$$\sqrt{40} = x$$

$$\cos \theta = \frac{\sqrt{40}}{7}$$

$$\tan \theta = \frac{3}{\sqrt{40}}$$

18.  $\cos \theta = \frac{\sqrt{5}}{3}$



$$\sin \theta = \frac{2}{3}$$

$$\tan \theta = \frac{2}{\sqrt{5}}$$

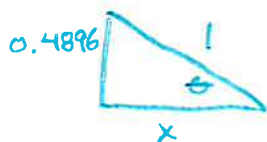
$$3^2 - \sqrt{5}^2 = y^2$$

$$9 - 5 = y^2$$

$$4 = y^2$$

$$2 = y$$

19.  $\sin \theta = 0.4896$



$$1^2 - (0.4896)^2 = x^2$$

$$1 - 0.2397 = x^2$$

$$0.7603 = x^2$$

$$0.8719 = x$$

$$\cos \theta = 0.8719$$

$$\tan \theta = \frac{0.4896}{0.8719}$$

$$= 0.5615$$

20.  $\cos \theta = 0.7942$



$$1^2 - 0.7942^2 = y^2$$

$$0.3692 = y^2$$

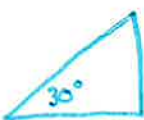
$$0.6077 = y$$

$$\sin \theta = 0.6077$$

$$\tan \theta = \frac{0.6077}{0.7942} = 0.7651$$

EXTENDING LEVEL QUESTIONS

21. If a triangle has a value of  $\sin 30^\circ$ , what is the cosine value in the same triangle?



sin - cos relationship  
 $\sin \theta = \cos 90 - \theta$

$$60^\circ$$

22. Solve

$$\sin^2 45^\circ + \cos^2 45^\circ = ?$$

By Pythagorean Identity

$$\sin^2 \theta + \cos^2 \theta = 1$$

$$\text{so } \sin^2 45^\circ + \cos^2 45^\circ = 1$$

23. Write  $\tan 65^\circ$  in terms of sine and cosine.

$$\tan 65^\circ = \frac{\sin 65^\circ}{\cos 65^\circ}$$

24. Write  $\sin^2 \theta + \cos^2 \theta = 1$  in terms of tangent and cosine only.

$$\frac{\sin^2 \theta + \cos^2 \theta}{\cos^2 \theta} = \frac{1}{\cos^2 \theta}$$

$$\tan^2 \theta + 1 = \frac{1}{\cos^2 \theta}$$