

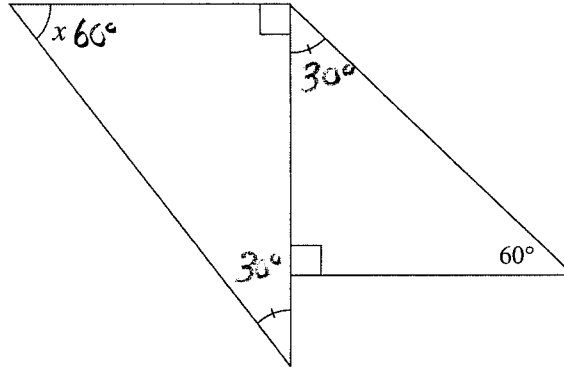
D SHAPE AND SPACE
(Measurement)

D3 solve problems involving two right triangles

Knowledge

Prescribed Learning Outcomes – D3

128. What is the measure of $\angle x$?



- A. 30°
- B. 45°
- C. 60°
- D. 90°

*

129. What is the measure of $\angle x$ to the nearest degree?

① 'y':

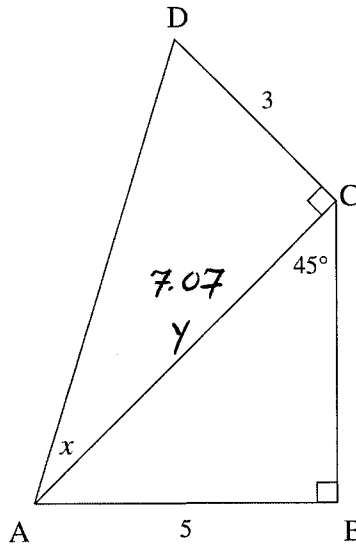
$$\sin 45^\circ = \frac{5}{x}$$

$$x = \underline{7.07}$$

② 'x':

$$\tan \angle x = \frac{3}{7.07}$$

$$\angle x = \tan^{-1}\left(\frac{3}{7.07}\right)$$



Answer

$$23 = \angle x$$

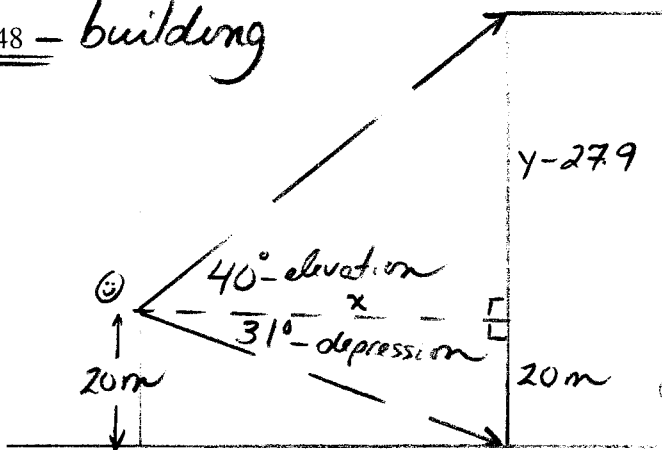
Higher Mental Processes

Prescribed Learning Outcomes – D3; A4, A5, A7

130. A window on the fourth floor of a building is 20 m above the ground. From the window, the angle of depression to the base of a nearby building is 31° and the angle of elevation to the top of the building is 40° . How tall is the nearby building to the nearest metre?

Answer

48 – building



Solution:

① 'x' – use 'x' to find 'y'

$$\tan 31^\circ = \frac{20}{x}$$

$$x = \frac{20}{\tan 31^\circ}$$

$$x = 33.29 \text{ m}$$

② 'y' $\tan 40^\circ = \frac{y}{33.29}$

$$\therefore y = 27.9 \text{ m}$$

D SHAPE AND SPACE (Measurement)	D4 extend the concepts of sine and cosine for angles through to 180°
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Knowledge

Prescribed Learning Outcomes – D4

131. If $\sin A = \sin 165^\circ$, $\angle A$ must equal 165° .

- A. True
- * B. False

$\angle A$ can be 165° but remember that Sine values are positive in Quad I & II, $\therefore \angle$ can also be 15° [$180^\circ - 165^\circ$]

Understanding

Prescribed Learning Outcomes – D4

132. Find the value(s) for A ($0^\circ \leq A \leq 180^\circ$) when $\sin A = 0.866$, to the nearest degree.

- A. 30°
- B. 60°
- C. $30^\circ, 150^\circ$
- * D. $60^\circ, 120^\circ$

$\angle A = \sin^{-1} 0.866$
 $\angle A = 60^\circ$ [might lead to answer B but Sine is positive in 2 quadrants $\therefore 180^\circ - 60^\circ = 120^\circ$]

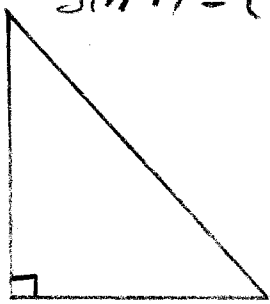
Match each Expression on the left with an Equivalent Expression on the right.
Each Equivalent Expression may be used once, more than once or not at all.

Expression	Equivalent Expression
For each expression, $A + B = 90^\circ$.	
F 133. $\sin A$ [could be $\cos B$ as well]	A. $\cos A$
C 134. $-\cos A$ [Quad II $\therefore \cos 180^\circ - A$ if $\angle A$ is in Quad I]	B. $\sin 0^\circ$
A 135. $\sin B$	C. $\cos(180^\circ - A)$
B 136. $\cos(A + B) = \cos 90^\circ = \sin 0^\circ$	D. $\sin A + \sin B$
E 137. $\sin(A + B) = \sin 90^\circ = \cos 0^\circ$	E. $\cos 0^\circ$
	F. $\sin(180^\circ - A)$
	G. 90°
	H. $\cos A + \cos B$

Answers

133. F
134. C
135. A
136. B
137. E

In any right triangle where $\angle A + \angle B = 90^\circ$,
A $\sin A = \cos B$ [Try $\sin 30^\circ$ & $\cos 60^\circ$]



$$\sin B = \cos A$$

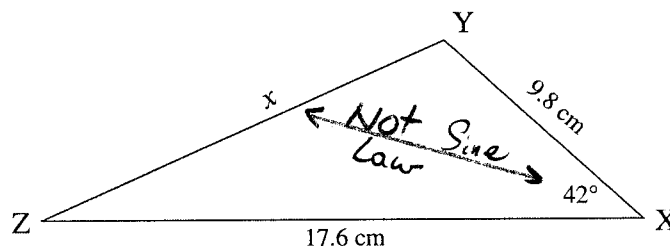
\therefore Some questions are based on this information.

D SHAPE AND SPACE (Measurement)	D5 apply the sine and cosine laws, excluding the ambiguous case, to solve problems
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Knowledge

Prescribed Learning Outcomes – D5

138. Which of the following would be used to solve for side x in the fewest steps?



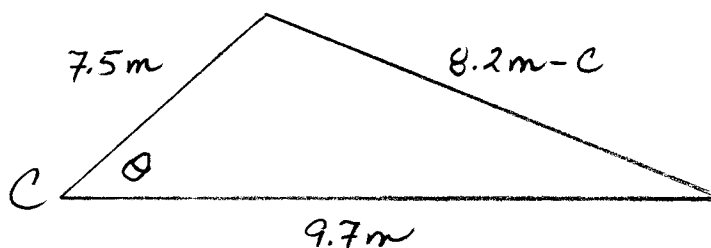
- * A. Sine Law
 B. Cosine Law
 C. Distance Formula
 D. Pythagorean Theorem

Understanding

Prescribed Learning Outcomes – D5; A1, A5

139. A triangular garden has sides of length 7.5 m, 8.2 m, and 9.7 m. What is the measure of the angle between the shortest and longest sides?

- * A. 15°
 B. 55°
 C. 57°
 D. 75°



$$\cos C = \frac{c^2 - a^2 - b^2}{-2ab} \quad \leftarrow \text{Not given on Provincial!}$$

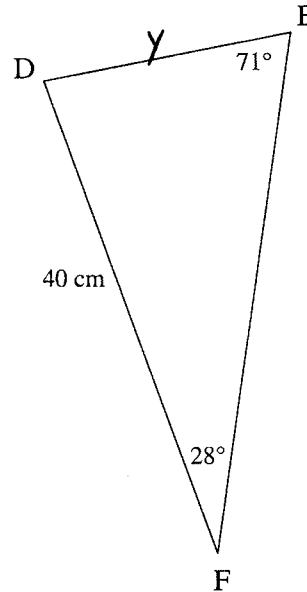
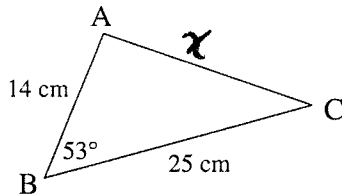
$$\cos C = \frac{[8.2^2 - 7.5^2 - 9.7^2]}{[-2(7.5)(9.7)]} \quad \leftarrow \text{Use Brackets}$$

$$\angle C = 55^\circ$$

140. The lengths of sides AC and DE (rounded to the nearest centimetre) are the same.

$$\chi^2 = 14^2 + 25^2 - 2(14)(25)\cos 53^\circ$$

$$\chi = \underline{19.99} \text{ [20cm]}$$



$$\frac{\sin 71^\circ}{40} = \frac{\sin 28^\circ}{y}$$

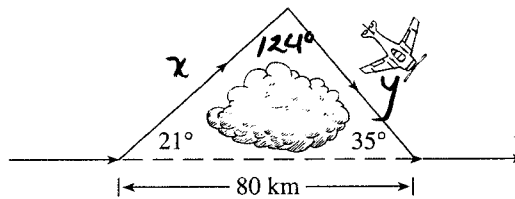
$$y = \frac{40 \sin 28^\circ}{\sin 71^\circ}$$

$$y = 19.86$$

$$\text{[20cm]}$$

- * A. True
B. False

141. An airline pilot decides to detour around a group of thunder clouds. (As shown in the diagram below.) He turns the plane at an angle of 21° to its original path, flies for a while, turns and intercepts the original path at an angle of 35° , 80 km from where the plane left the original path.



$$\frac{\sin 124^\circ}{80} = \frac{\sin 35^\circ}{x}$$

$$x = 55.349$$

How much farther was the detour route than the original route?

- * A. 6.65 km
B. 9.93 km
C. 24.65 km
D. 89.93 km

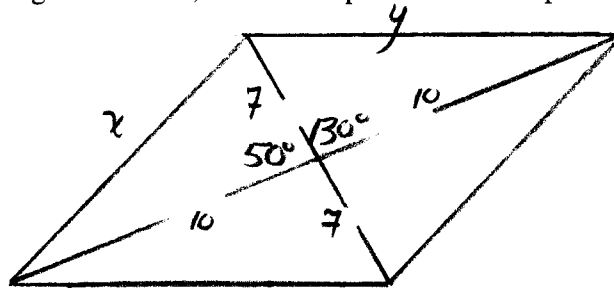
$$\frac{\sin 124^\circ}{80} = \frac{\sin 21^\circ}{y}$$

$$y = 34.582$$

$$\therefore (x+y) - 80 \text{ km} = 9.93$$

142. A parallelogram has diagonals that are 14 cm and 20 cm long. If the angle formed by the intersection of the diagonals is 50° , what is the perimeter of the parallelogram?

- A. 23.14 cm
 B. 30.72 cm
 * C. 46.28 cm
 D. 92.56 cm



143. A ship travels due west for 550 km then travels $N40^\circ W$ (bearing 320°) for 700 km. How far is the ship from its starting point?

- A. 450 km
 B. 890 km
 * C. 1135 km
 D. 1250 km

$$\begin{aligned} x^2 &= 550^2 + 700^2 - 2(550)(700)\cos 130^\circ \\ x &= 1134.66 \text{ km} \end{aligned}$$

142.

$$x^2 = 7^2 + 10^2 - 2(7)(10)\cos 50^\circ$$

$$x = 7.68 \text{ cm}$$

$$y^2 = 7^2 + 10^2 - 2(7)(10)\cos 130^\circ$$

$$y = 15.46 \text{ cm}$$

$$\therefore P = 2(x + y)$$

$$P = 46.28 \text{ cm}$$

143.

