MPM2D
June 5, 2019

KNOWLEDGE (KU)		/29
APPLICATION (AP)		/16
THINKING (TI)		/18
COMMUNICATION (CO)		level

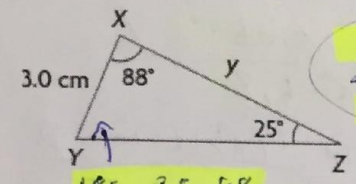
Name: ANSWERS

TEST #7 ACUTE TRIANGLE TRIGONOMETRY

Knowledge & Understanding (KU)

1. Determine the measure of the indicated side for each of the following.

a.)



AAS
sine law

$180 - 25 - 88 = 67°$ ✓

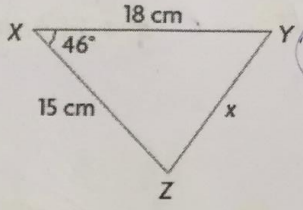
$\frac{\sin Z}{z} = \frac{\sin Y}{y}$

$\frac{\sin 25°}{3} = \frac{\sin 67°}{y}$ ✓

$y = \frac{(3)(\sin 67°)}{\sin 25°}$ ✓

$y = 6.5\text{cm}$ ✓

b.)



SAS
cosine law

$x^2 = y^2 + z^2 - 2yz\cos X$

$x^2 = (15)^2 + (18)^2 - 2(15)(18)\cos 46°$ ✓

$x^2 = 225 + 324 - 375$ ✓

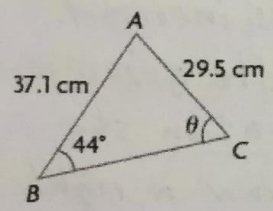
$\sqrt{x^2} = \sqrt{174}$

$x = 13\text{cm}$ ✓

Out of 7

2. Determine the measure of the indicated angle for each of the following.

a.)



SSA
sine law

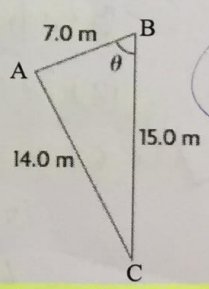
$\frac{\sin B}{b} = \frac{\sin C}{c}$

$\frac{\sin 44°}{29.5} = \frac{\sin \theta}{37.1}$ ✓

$\angle\theta = \sin^{-1}\left(\frac{(37.1)(\sin 44°)}{29.5}\right)$ ✓

$\angle\theta = 61°$ ✓

b.)



SSS
cosine law

$b^2 = a^2 + c^2 - 2ac\cos B$

$(14)^2 = (15)^2 + (7)^2 - 2(15)(7)\cos\theta$ ✓

$196 - 225 - 49 = -210\cos\theta$ ✓

$\cos^{-1}\left(\frac{-78}{-210}\right) = \angle\theta$

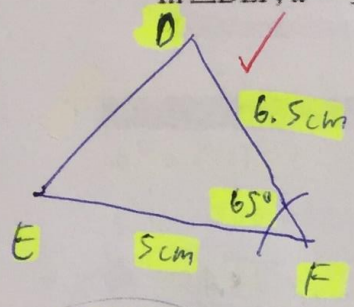
$68° = \angle\theta$ ✓

Out of 6

13

3. Solve the triangle (find all angles and sides).

In $\triangle DEF$, $d = 5.0$ cm, $e = 6.5$ cm, and $\angle F = 65°$.



$f^2 = d^2 + e^2 - 2de\cos F$

$f^2 = (5)^2 + (6.5)^2 - 2(5)(6.5)\cos 65°$

$f^2 = 25 + 42.3 - 27.5$

$\sqrt{f^2} = \sqrt{39.8}$

$f = 6.3$ cm

SAS

cosine law

$\frac{\sin D}{d} = \frac{\sin E}{e} = \frac{\sin F}{f}$

$\frac{\sin D}{5} = \frac{\sin E}{6.5} = \frac{\sin 65°}{6.3}$

$\frac{\sin D}{5} = \frac{\sin 65°}{6.3}$

$\angle D = \sin^{-1}\left(\frac{(5)(\sin 65°)}{6.3}\right)$

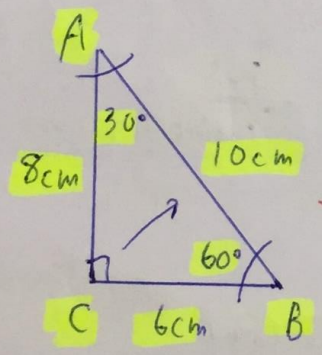
$\angle D = 46°$

$\therefore \angle E = 180° - 65° - 46°$

$\angle E = 69°$

Out of 10

4. Jane claims that she can draw an acute triangle using the following information: $a = 6$ cm, $b = 8$ cm, $c = 10$ cm, $\angle A = 30°$, and $\angle B = 60$. Is she correct? Explain.



$a^2 + b^2 = c^2$

$(8)^2 + (6)^2 = (10)^2$

$64 + 36 = 100$

$100 = 100$

LS = RS

Jane is incorrect. With the given information she can draw a right angle triangle

Out of 3

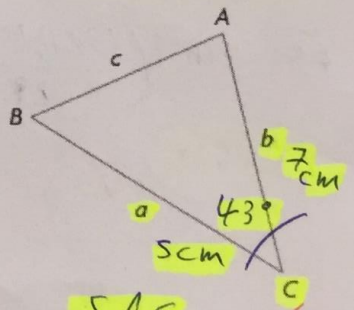
5. Suppose that you are given the following set of data for $\triangle ABC$ at the right. Can you use the cosine law to determine c? Explain.

$a = 5$ cm, $b = 7$ cm, $\angle C = 43°$

Since you are given SAS you can use cosine law to determine c.

$c^2 = a^2 + b^2 - 2ab\cos C$

$c^2 = (5)^2 + (7)^2 - 2(5)(7)\cos 43°$



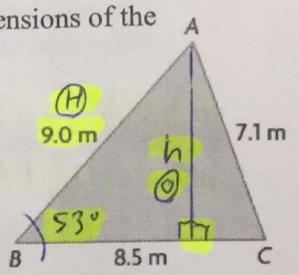
SAS

Out of 3

16

Application (AP)

1. Terry is designing a new triangular patio. The diagram at the right shows the dimensions of the patio. Calculate the area of the patio.



$b^2 = a^2 + c^2 - 2ac\cos B$

$(7.1)^2 = (8.5)^2 + (9)^2 - 2(8.5)(9)\cos B$

$50.4 = 72.3 + 81 - 153\cos B$

$50.4 - 72.3 - 81 = -153\cos B$

$\cos^{-1}\left(\frac{-102.9}{-153}\right) = \angle B$

$47° = \angle B$

$\sin 47° = \frac{O}{H}$

$\sin 47° = \frac{h}{9}$

$h = 6.6\ m$

SSS

cosine law

$b = 8.5$

$h = 6.6$

$A = \frac{bh}{2}$

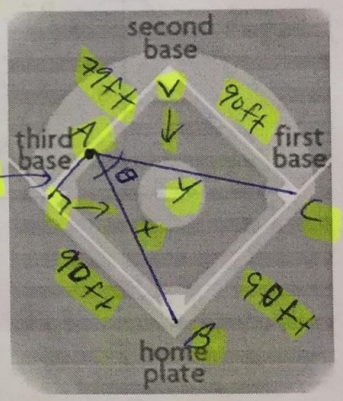
$A = \frac{(8.5)(6.6)}{2}$

$A = 28\ m^2$

Out of 8

∴ the area of the patio is $28\ m^2$

2. The bases in a baseball diamond are 90 ft apart. A player picks up a ground ball 11 ft from third base, along the line from second base to third base. Determine the angle that is formed between first base, the player's present position, and home plate.



$a^2 + b^2 = c^2$

$(11)^2 + (90)^2 = (x)^2$

$\sqrt{8221} = \sqrt{x^2}$

$90.7 = x$

$a^2 + b^2 = c^2$

$(79)^2 + (90)^2 = (y)^2$

$\sqrt{14341} = \sqrt{y^2}$

$119.8 = y$

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

$(90)^2 = (119.8)^2 + (90.7)^2 - 2(119.8)(90.7)\cos A$

$\frac{-14479}{-21732} = \frac{-21732\cos A}{-21732}$

$\cos^{-1}(0.6663) = \angle A$

$48° = \angle A$

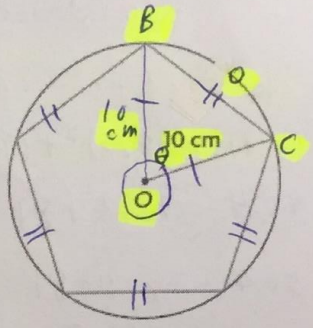
∴ the angle formed is 48°

Out of 8

16

Thinking & Inquiry (TI)

1. A regular pentagon is inscribed in a circle with radius 10 cm as shown in the diagram at the right. Determine the perimeter of the pentagon.



$o^2 = b^2 + c^2 - 2bc\cos O$

$o^2 = (10)^2 + (10)^2 - 2(10)(10)\cos 72°$ ✓

$o^2 = 100 + 100 - 62$ ✓

$\sqrt{o^2} = \sqrt{138}$

$o = 11.7\text{ cm}$ ✓

$\angle\theta = \frac{360°}{5}$ ✓

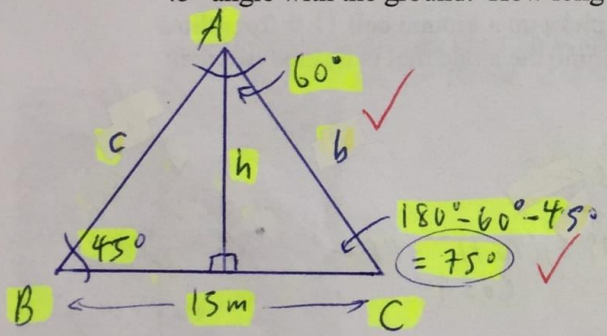
$\angle\theta = 72°$ ✓

$\therefore P = 5(11.7)$ ✓

$P = 58.7\text{cm}$ ✓

Out of 7

2. A telephone pole is supported by two wires on opposite sides. At the top of the pole, the wires form an angle of 60°. On the ground, the ends of the wires are 15.0 m apart. One wire makes a 45° angle with the ground. How long are the wires, and how tall is the pole?



$\frac{\sin A}{a} = \frac{\sin B}{b} = \frac{\sin C}{c}$

$\frac{\sin 60°}{15} = \frac{\sin 45°}{b} = \frac{\sin 75°}{c}$

$\frac{\sin 60°}{15} = \frac{\sin 45°}{b}$ ✓

$b = \frac{(15)(\sin 45°)}{\sin 60°}$ ✓

$b = 12.2\text{m}$ ✓

$\frac{\sin 60°}{15} = \frac{\sin 75°}{c}$ ✓

$c = \frac{(15)(\sin 75°)}{\sin 60°}$ ✓

$c = 16.7\text{m}$ ✓

$\sin 45° = \frac{o}{H}$

$\frac{\sin 45°}{1} = \frac{h}{16.7}$ ✓

$h = 11.8\text{m}$ ✓

∴ the pole is 11.8m tall and the 2 wires are 12.2m and 16.7m ✓

Out of 11

18