Name: ____________________ Date: ____________

MPM 2D **Formative Assessment: Similar Triangles & Pythagorean Theorem**

Expectations you're working on…

☐ Students will use their knowledge of ratio and proportion to ~~investigate similar triangles and solve~~ problems related to similarity

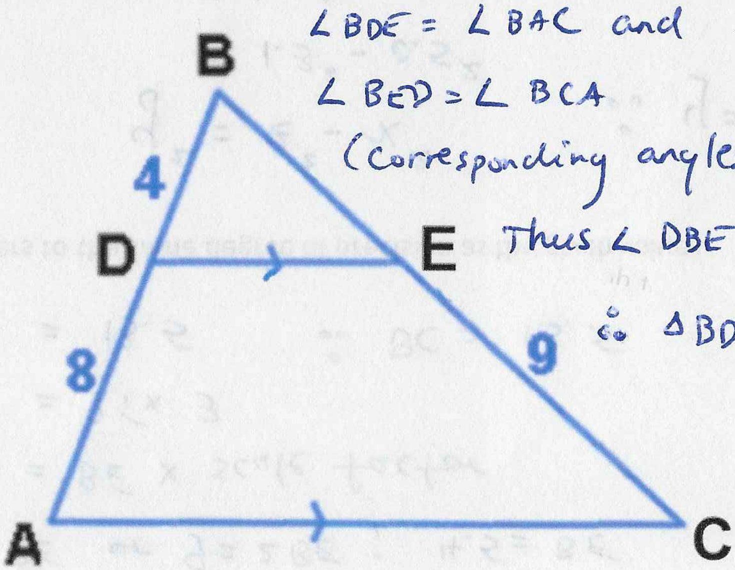
☐ Students will solve problems involving right triangles using ~~the primary trigonometric ratios and~~ the Pythagorean Theorem

Still Learning…	Almost There…	Got It!

Part A-Knowledge & Understanding

Communication Corner (leave blank)

1. Use the diagram to answer the following questions:



a) Which two triangles are similar?

ΔBDE and ΔBAC

b) How do you know they are similar?

b) Since $DE \parallel AC$,
$\angle BDE = \angle BAC$ and
$\angle BED = \angle BCA$
(corresponding angles)
Thus $\angle DBE = \angle ABC$.
$\therefore \Delta BDE \sim \Delta BAC$

c) $BA = 4 + 8$
$= 12$

$\frac{BA}{BD} = \frac{12}{4}$
$= 3$ (scale factor)

Thus, ΔBAC has side lengths three times longer than ΔBDE. (over →)

p1

c) Use the fact that they are similar to find the length of ~~BE~~ BC. Show your work.

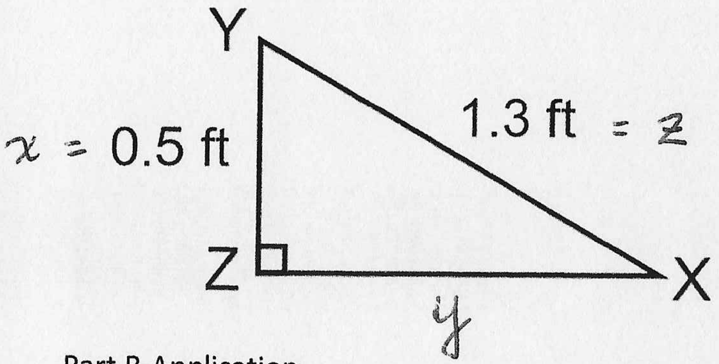
Since DA = 2 BO, then EC = 2 BE or 9 = 2BE ; 4.5 = BE

Using the similar triangles, BC = BE × scale factor

= 4.5 × 3

= 13.5 ∴ BC = 13.5

2. Solve for the unknown length. Round your answers to the same degree of precision as the given values.



$y^2 = z^2 - x^2$

$= 1.3^2 - 0.5^2$

$= 1.69 - 0.25$

$= 1.44$

$y = \sqrt{1.44}$

∴ $y = 1.2$ ft

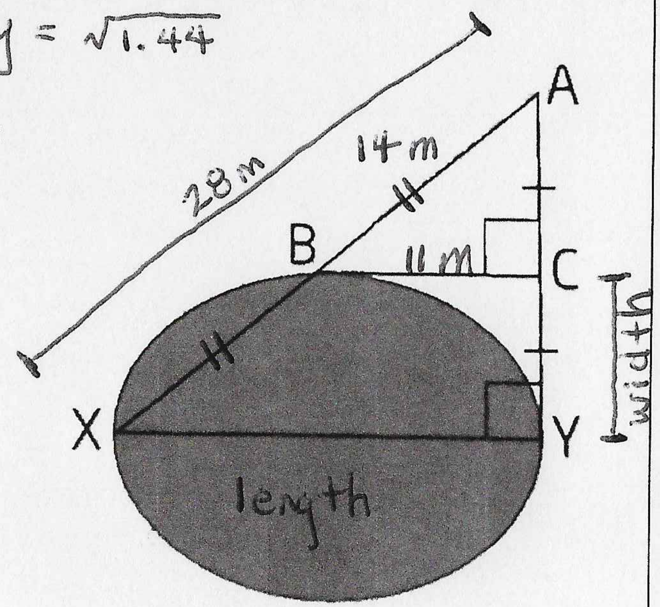
Part B-Application

3. Find the length and width of the pond using two, different methods. The following measures are known:

AB = 14 m

BC = 11 m

Assume that XY is a line of symmetry for the pond.



Communication Corner
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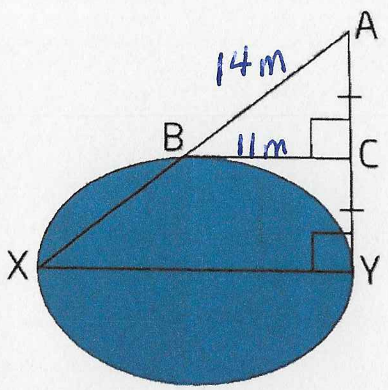
Method 1: Pythagorean Theorem

Finding the width:



$AB = 14m$

$BC = 11m$

$AC^2 = AB^2 - BC^2$

$= 14^2 - 11^2$

$= 196 - 121$

$= 75$

$AC = \sqrt{75}$

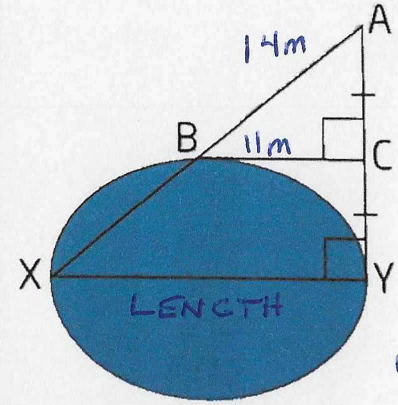
$\doteq 8.7$

$\therefore$ Since $AC = CY$, where CY is the width of the pond,

$CY \doteq 8.7m$

Method 2: Similar Triangles

Finding the Length:



$AB = 14m$

$BC = 11m$

Note that $AC = CY$.

Thus, $\frac{AY}{AC} = \frac{2}{1}$, where $k = 2$ is the scale factor relating $\triangle ABC$ and $\triangle AXY$.

So $XY = 2BC$, where XY is the length of the pond.

$\therefore XY = 2(11)$

$= 22$

$\therefore XY = 22.0m$ (rounding to the nearest tenth of a decimal)

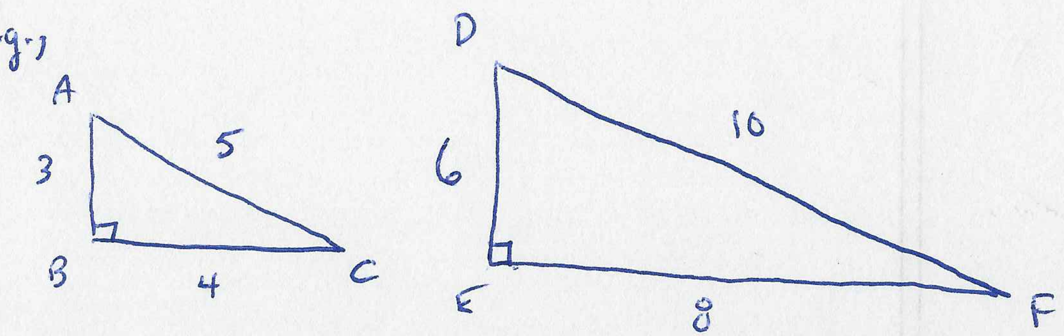
Part C-Thinking, Inquiry and Problem Solving

Statement: *The square of the scale factor relates the areas of two similar figures.*

Given that the area of a triangle is given by the formula, $A = \frac{bh}{2}$, create your own example involving similar triangles that proves the statement.

Communication Corner (leave blank)

E.g.,



$\Delta ABC \sim \Delta DEF$ since $\frac{DE}{AB} = \frac{EF}{BC} = \frac{AC}{AC} = \frac{2}{1}$ or 2 which is the scale factor that relates the side lengths of ΔABC and ΔDEF.

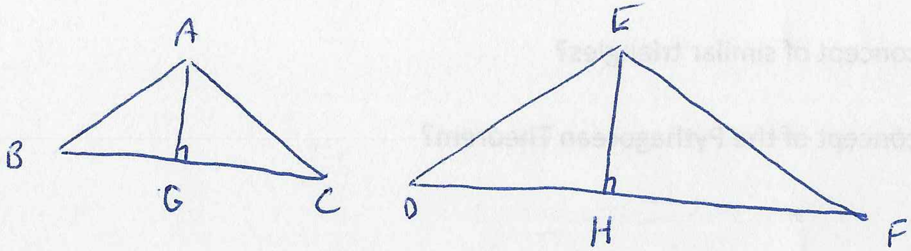
$\therefore A_\Delta = \frac{bh}{2}$, $A_{\Delta ABC} = \frac{4(3)}{2}$ and $A_{\Delta DEF} = \frac{8(6)}{2}$, then

$= 6$ $\qquad = 24$

$\frac{A_{\Delta DEF}}{A_{\Delta ABC}} = \frac{24}{6} = 4 = (2)^2$, where 2 is the scale factor.

From this, $(2)^2 A_{\Delta ABC} = A_{\Delta DEF}$; $(2)^2 6 = 24$; $4(6) = 24$; $24 = 24$.

$\therefore$ The square of the scale factor relates the areas of ΔABC and ΔDEF.



If $\triangle ABC \sim \triangle DEF$, then

$\frac{AG}{EH} = K$, $\frac{AB}{ED} = K$, $\frac{AC}{EF} = K$, and $\frac{BC}{DF} = K$, where K is the scale factor that relates the side lengths of $\triangle ABC$ to $\triangle DEF$

$\because A_{\triangle} = \frac{bh}{2}$, then $A_{\triangle ABC} = \frac{BC(AG)}{2}$ and $A_{\triangle DEF} = \frac{DF(EH)}{2}$

$$\frac{A_{\triangle ABC}}{A_{\triangle DEF}} = \frac{BC(AG)}{2} \div \frac{DF(EH)}{2}$$

$$= \frac{BC(AG)}{\cancel{2}_1} \times \frac{\cancel{2}^1}{DF(EH)}$$

$$= \frac{BC(AG)}{DF(EH)}$$

$$= \frac{BC}{DF} \times \frac{AG}{EH}$$

$\because \frac{BC}{DF} = \frac{AG}{EH} = K$, then

$$\frac{BC}{DF} \times \frac{AG}{EH} = K \times K$$

$$= K^2$$

So $\frac{A_{\triangle ABC}}{A_{\triangle DEF}} = K^2$

$\therefore$ The areas of $\triangle ABC$ and $\triangle DEF$ are related by a factor of K^2.