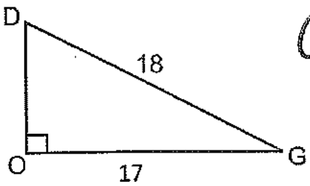
Unit 3 Review Use the Pythagorean theorem, proportions, sine rule, triangle sum, cosine rule, or right triangle trigonometric ratios to solve the problem. ***Some triangles require multiple METHODS to solve.***

1. Solving Method(s) Cosine Ratio

Find the measure of angle *G*.



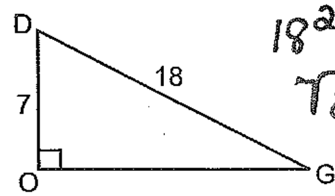
$\cos(G) = \frac{17}{18}$

$G = \cos^{-1}\left(\frac{17}{18}\right)$

$\boxed{G \approx 19.2^\circ}$

2. Solving Method(s) Pyth theorem, Cosine

Find the length of side *OG* and the measure of angle *D*.



$18^2 - 7^2 = OG^2$

$\sqrt{275} = OG$

$OG \approx 16.6$

$\cos(D) = \frac{7}{18}$ $D = \cos^{-1}\left(\frac{7}{18}\right)$

$\boxed{D \approx 67.1^\circ}$

3. Solving Method(s) Δsum, Sine rule, Area

Find the area of triangle ABC

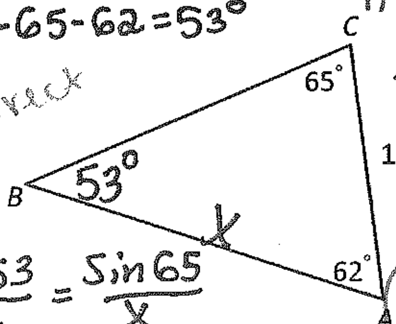
$180 - 65 - 62 = 53^\circ$

$A = \frac{1}{2}(17)(19.3)\sin 62^\circ$

$A = \frac{1}{2}(17)(17.6)\sin 62^\circ$

$\boxed{A \approx 132 \text{ units}^2}$

Incorrect



should be 65 $A \approx 144.787$ units²

$\frac{\sin 53}{17} = \frac{\sin 65}{x}$

$x(\sin 53) = 17(\sin 65)$

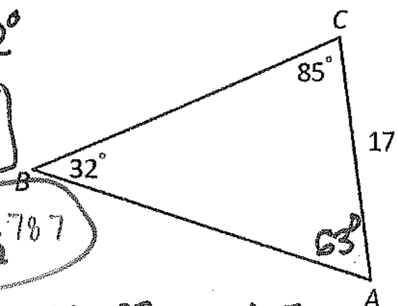
$x = \frac{17(\sin 65)}{\sin(53)}$ $\boxed{x \approx 17.6}$

$x \approx 19.29$

4. Solving Method(s) Δsum, sine rule

Find the side length of BC.

$180 - 85 - 32 = 63^\circ$



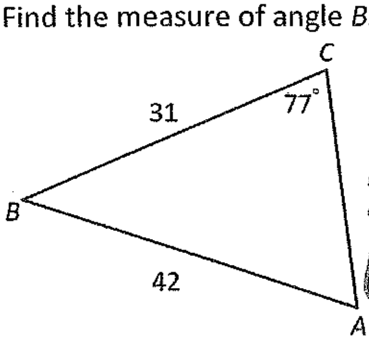
$\frac{\sin 63}{BC} = \frac{\sin 32}{17}$

$\frac{BC(\sin 32)}{\sin(32)} = \frac{17(\sin 63)}{\sin(32)}$

$\boxed{BC \approx 28.6}$

5. Solving Method(s) Sine rule, Δsum

Find the measure of angle *B*.



$A \approx 46^\circ$

$B \approx 180 - 77 - 46$

$\boxed{B \approx 57^\circ}$

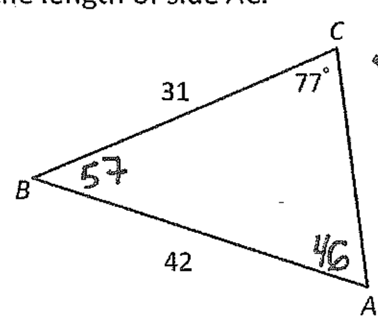
$\frac{\sin A}{31} = \frac{\sin 77}{42}$

$\sin A = \frac{31(\sin 77)}{42}$

$A = \sin^{-1}\left(\frac{31(\sin 77)}{42}\right)$

6. Solving Method(s) Sine rule, Δsum, sine rule

Find the length of side *AC*.



(From 5)

$A \approx 46^\circ$

$B \approx 57^\circ$

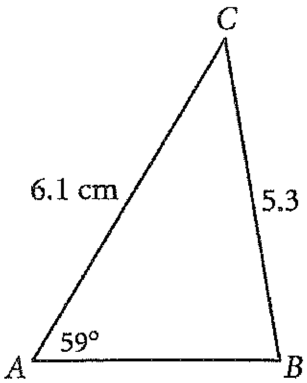
$\frac{\sin(57)}{AC} = \frac{\sin 77}{42}$

$\boxed{AC \approx 36.2}$

$AC = \frac{42(\sin(57))}{\sin 77}$

7. Solving Methods Sine rule, Δsum, Area

Find the area of triangle *ABC*.



$\frac{\sin B}{6.1} = \frac{\sin 59}{5.3}$

$\sin B = \frac{6.1(\sin 59)}{5.3}$

$B = \sin^{-1}\left(\frac{6.1(\sin 59)}{5.3}\right)$

$B \approx 81°$

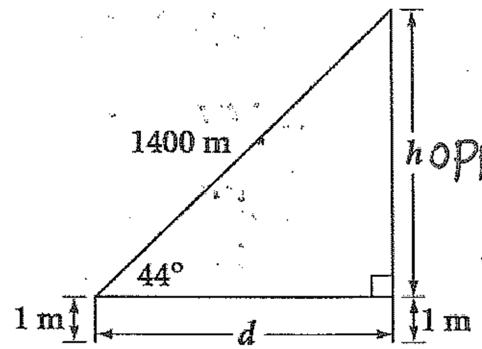
$C \approx 180 - 59 - 81 \approx 40°$

$A = \frac{1}{2}(6.1)(5.3)\sin(40)$

$A \approx 10.4\ cm^2$

8. Solving Method(s) Sine ratio

A meteorologist Wanda Morris uses an angle-measuring device on a 1-meter-tall tripod to find the height of a weather balloon. She views the balloon at a 44° angle of elevation. A radio signal from the balloon tells her that it is 1400 meters from her device. How high is the balloon?

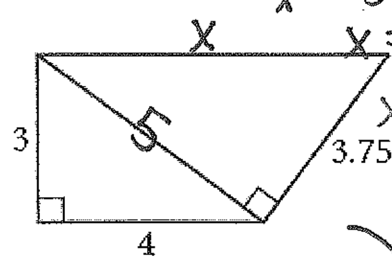


$\sin 44 = \frac{h}{1400}$

$h = 1400(\sin 44)$

$\boxed{h \approx 972.5m}$

9. Are the two rectangles similar? Why or why not?



$x^2 = 5^2 + 3.75^2$

$x = \sqrt{25 + 14.06}$

$x \approx 6.25$

$\frac{3}{3.75} \approx .8$ $\quad \frac{5}{6.25} \approx .8$

$\frac{4}{5} \approx .8$

Side length ratios are equal so they are similar.

10. Annie works in a magazine's advertising department. A client has requested that his 5 cm-by-12 cm ad be enlarged: "Double the length and double the width, then send me the bill." The original ad cost $1500. How much should Annie charge for the larger ad. Explain your reasoning.

Sides: 5 cm : 12 cm Double: 10 cm : 24 cm

Area = 60 cm² Area = 240 cm² (= 4 · 60 cm²)

Double dimensions = 4 times the area

Cost 4($1500) = $6000

11. Solve the rational equations.

$8\left(\frac{x+3}{2} + \frac{x-2}{4} = \frac{x+1}{8}\right)$

$4(x+3) + 2(x-2) = x+1$

$4x + 12 + 2x - 4 = x + 1$

$6x + 8 = x + 1$

$5x = -7$

$\boxed{x = -\frac{7}{5}}$

$4\left(\frac{x-4}{3}\right) - \frac{3x+7}{12} = \frac{x+1}{6}$

$\frac{4(x-4) - (3x+7)}{12} = \frac{x+1}{6}$

$\frac{4x - 16 - 3x - 7}{17} = \frac{x+1}{6}$

$\frac{x-23}{17} = \frac{x+1}{6}$

$24\left(\frac{3x+1}{4} - \frac{1-2x}{6} = \frac{3x+2}{8}\right)$

$6(3x+1) - 4(1-2x) = 3(3x+2)$

$18x + 6 - 4 + 8x = 9x + 6$

$26x + 2 = 9x + 6$

$17x = 4$

$\boxed{x = \frac{4}{17}}$

→ ON BACK

(11e) Continued

$$\frac{x-23}{17} = \frac{x+1}{6}$$

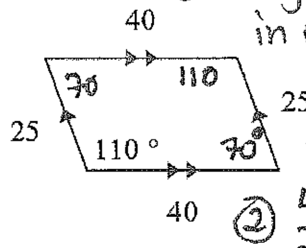
$$6x - 138 = 17x + 17$$

$$-155 = 11x$$

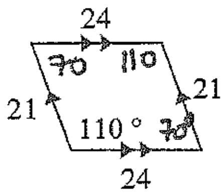
$$\boxed{-\frac{155}{11} = x}$$

12. Defend whether the parallelograms are similar. Use appropriate vocab and algebra.

① Angles are congruent in corresponding positions.



② $\frac{40}{24} \approx 1.67$



$\frac{25}{21} \approx 1.19$

$\boxed{1.67 \neq 1.19}$

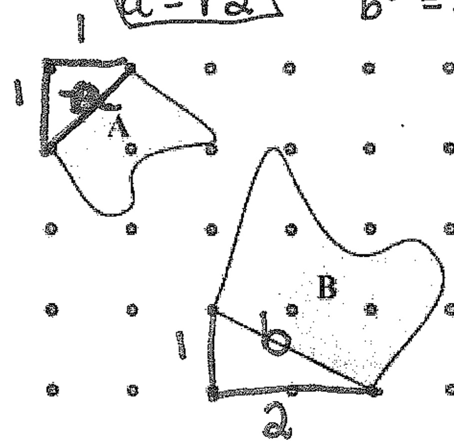
Parallelograms are not similar because the corresponding sides do not produce the same ratio.

13. Figures **A** and **B** are similar. The dots shown are equally spaced at intervals of 1 unit. If figure **A** has area 1.6 units^2, find the area of figure **B**.

$a^2 = 1^2 + 1^2$ $\boxed{a = \sqrt{2}}$

$b^2 = 1^2 + 2^2$

$b^2 = 5$ $\boxed{b = \sqrt{5}}$



Side ratio

$\frac{\sqrt{2}}{\sqrt{5}}$

Area Ratio

$\left(\sqrt{\frac{2}{5}}\right)^2 = \frac{2}{5}$

Area proportion

$\frac{2}{5} = \frac{1.6}{B}$ $2B = 8$ $\boxed{B = 4 \text{ units}^2}$

14. How do we move between 1 dimensional and 2 dimensional measures/ratios?

Side: $\frac{m}{n}$ Area: $\frac{m^2}{n^2}$

a)

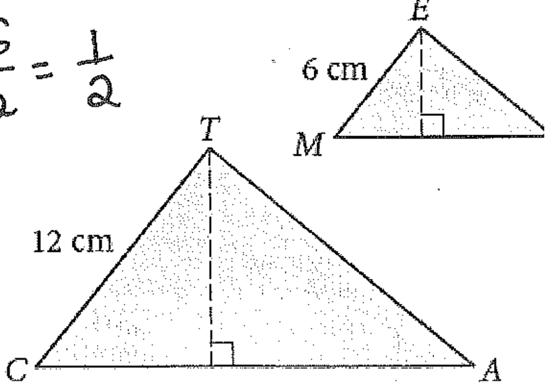
$\triangle CAT \sim \triangle MSE$

Area of $\triangle CAT = 72 \text{ cm}^2$

Area of $\triangle MSE = \underline{?}$ $\boxed{18 \text{cm}^2}$

Side ratio

$\frac{6}{12} = \frac{1}{2}$



Area ratio

$\left(\frac{1}{2}\right)^2 = \frac{1}{4}$

Area proportion

$\frac{1}{4} = \frac{x}{72}$ $\boxed{x = 18 \text{cm}^2}$

$4x = 72$

b)

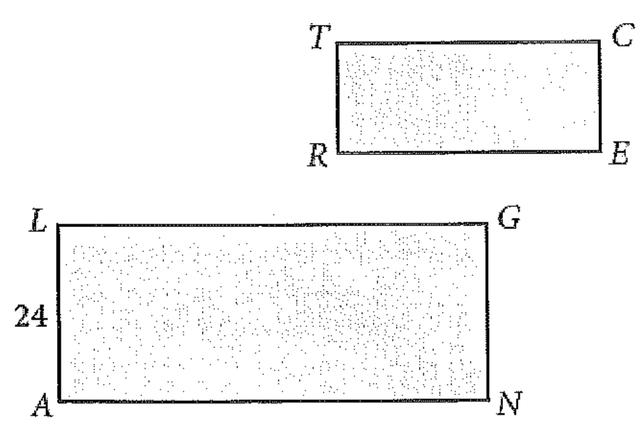
$RECT \sim ANGL$

$\frac{\text{Area of } RECT}{\text{Area of } ANGL} = \frac{9}{16}$

$TR = \underline{?}$

Side ratio

$\sqrt{\frac{9}{16}} = \frac{3}{4}$



$\frac{TR}{24} = \frac{3}{4}$ $\boxed{TR = 18}$