Mini-Test 2-1: Pythagorean Theorem and Similar Triangles
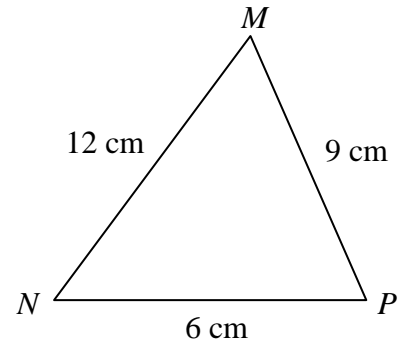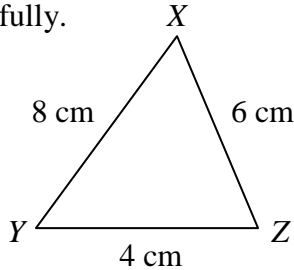
K: _____	C: _____	A: _____
6	4	12

Instructions: Show your work. Marks will be deducted for improper form.

Knowledge: 6 Marks

1. Examine the following triangles carefully.

(a) Are these similar triangles? Justify your answer.   [K: 4]

$$\frac{XY}{MN} = \frac{8}{12} = \frac{2}{3} \text{ or } 0.67 \qquad\qquad \text{Since } \frac{XY}{MN} = \frac{YZ}{NP} = \frac{XZ}{MP} = \frac{2}{3}, \text{ the two triangles are similar.}$$

$$\frac{YZ}{NP} = \frac{4}{6} = \frac{2}{3} \text{ or } 0.67$$

$$\frac{XZ}{MP} = \frac{6}{9} = \frac{2}{3} \text{ or } 0.67$$

(b) If these are similar triangles, write the similar triangle statement?   [K: 2]

$\Delta XYZ \sim \Delta MNP$

Communication: 4 Marks
Write your answers in complete English sentences; otherwise, marks will be deducted.

2. Describe in words how you would determine whether the measures 4 cm, 8 cm, and 12 cm can form a right triangle. (Hint: Do not show steps of calculations.)   [C: 4]

I would use the Pythagorean theorem $c^2 = a^2 + b^2$ to determine whether the given measures can form a right triangle. Since 12 cm is the longest measure, it should be the measure of the hypotenuse, c. 4 cm and 8 cm should be the measures of the two legs, a and b. Let $c = 12, a = 4$ and $b = 8$. Check if 12^2 equals the sum of 4^2 and 8^2. If they do, the measures can form a right triangle. If they don't equal, the measures cannot form a right triangle.

Application: 12 Marks

3. If $\triangle OPQ \sim \triangle OTR$,
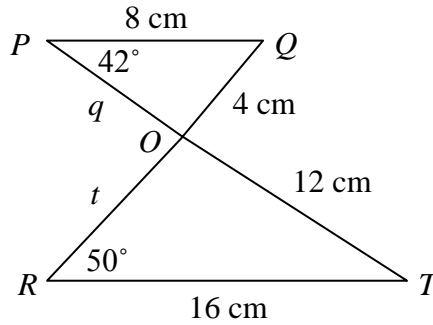
(a) Find the measure of $\angle OQP$, $\angle POQ$, $\angle ROT$, and $\angle OTR$, to the nearest degree.   [A: 4]

$\angle OQP = \angle ORT = 50°$

$\angle POQ = \angle ROT = 180° - 42° - 50° = 88°$

$\angle OTR = \angle QPO = 42°$

(b) Find the length of sides q and t, to the nearest centimetres.   [A: 5]

$$\frac{OP}{OT} = \frac{PQ}{TR} = \frac{OQ}{OR}$$

$$\frac{q}{12} = \frac{8}{16}$$

$$\frac{8}{16} = \frac{4}{t}$$
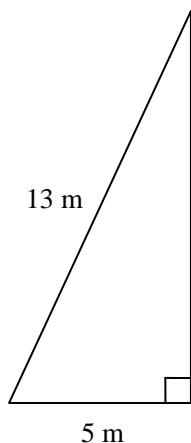
$$\frac{q}{12} = \frac{8}{16} = \frac{4}{t}$$

$$q = \frac{8 \times 12}{16}$$

$$t = \frac{4 \times 16}{8}$$

$$q = 6\,\text{cm}$$

$$t = 8\,\text{cm}$$

4. A school is erecting a new flagpole. The pole is supported by a 13-m guy wire anchored 5 m from the base of a pole. Find the height of the pole. (Hint: Draw a diagram.)   [A: 3]

$$\text{Hypotenuse} = 13\,\text{cm}$$
$$c^2 = a^2 + b^2$$
$$13^2 = 5^2 + b^2$$
$$13^2 - 5^2 = m^2$$
$$169 - 25 = m^2$$
$$144 = m^2$$
$$\sqrt{144} = \sqrt{m^2}$$
$$12\,\textbf{m} = m$$

The height of the pole is 12 m.