Exercise 10C

1. **(a)** AC is the longest side of $\triangle ABC$.

$$AC^2 = 65^2$$
$$= 4225$$
$$AB^2 + BC^2 = 16^2 + 63^2$$
$$= 256 + 3969$$
$$= 4225$$

Since $AC^2 = AB^2 + BC^2$, $\triangle ABC$ is a right-angled triangle where $\angle B = 90°$.

(b) EF is the longest side of $\triangle DEF$.

$$EF^2 = 27^2$$
$$= 729$$
$$DF^2 + DE^2 = 21^2 + 24^2$$
$$= 441 + 576$$
$$= 1017$$

Since $EF^2 \neq DF^2 + DE^2$, $\triangle DEF$ is not a right-angled triangle.

(c) GH is the longest side in $\triangle GHI$.

$$GH^2 = 7.5^2$$
$$= 56.25$$
$$HI^2 + GI^2 = 7.1^2 + 2.4^2$$
$$= 50.41 + 5.76$$
$$= 56.17$$

Since $GH^2 \neq HI^2 + GI^2$, $\triangle GHI$ is not a right-angled triangle.

Q#1

(d) MN is the longest side in $\triangle MNO$.

$$MN^2 = \left(\frac{5}{13}\right)^2$$
$$= \frac{25}{169}$$
$$NO^2 + MO^2 = \left(\frac{3}{13}\right)^2 + \left(\frac{4}{13}\right)^2$$
$$= \frac{9}{169} + \frac{16}{169}$$
$$= \frac{25}{169}$$

Since $MN^2 = NO^2 + MO^2$, $\triangle MNO$ is a right-angled triangle where $\angle O = 90°$.

2. PR is the longest side is $\triangle PQR$.

$$PR^2 = 30^2$$
$$= 900$$
$$PQ^2 + QR^2 = 19^2 + 24^2$$
$$= 361 + 576$$
$$= 937$$

Since $PR^2 \neq PQ^2 + QR^2$, $\triangle PQR$ is not a right-angled triangle.

3. $ST = \frac{7}{12}$ cm

$TU = \frac{5}{6}$ cm $= \frac{10}{12}$ cm

$SU = \frac{1}{3}$ cm $= \frac{4}{12}$ cm

TU is the longest side in $\triangle STU$.

$$TU^2 = \left(\frac{10}{12}\right)^2$$
$$= \frac{100}{144}$$
$$SU^2 + ST^2 = \left(\frac{4}{12}\right)^2 + \left(\frac{7}{12}\right)^2$$
$$= \frac{16}{144} + \frac{49}{144}$$
$$= \frac{65}{144}$$

Since $TU^2 \neq SU^2 + ST^2$, $\triangle STU$ is not a right-angled triangle.

4. In $\triangle PQS$, $\angle P = 90°$.

Using Pythagoras' Theorem,

$$SQ^2 = PQ^2 + PS^2$$
$$= 40^2 + 30^2$$
$$= 1600 + 900$$
$$= 2500$$
$$SQ = \sqrt{2500} \text{ (since } SQ > 0)$$
$$= 50 \text{ m}$$
$$\frac{SX}{SQ} = \frac{16}{16+9}$$
$$SX = \frac{16}{25} \times 50$$
$$= 32 \text{ m}$$
$$QX = 50 - 32$$
$$= 18 \text{ m}$$

To show Jun Wei stops at X is to show RX is perpendicular to QS.

We need to show $\triangle SXR$ and $\triangle QXR$ are right-angled triangles.

RS is the longest side in $\triangle SXR$.

$$RS^2 = 40^2$$
$$= 1600$$
$$SX^2 + RX^2 = 32^2 + 24^2$$
$$= 1024 + 576$$
$$= 1600$$

Since $RS^2 = SX^2 + RX^2$, $\triangle SXR$ is a right-angled triangle where $\angle X = 90°$.

QR is the longest side in $\triangle QXR$.

$$QR^2 = 30^2$$
$$= 900$$
$$RX^2 + QX^2 = 24^2 + 18^2$$
$$= 576 + 324$$
$$= 900$$

Since $QR^2 = RX^2 + QX^2$, $\triangle QXR$ is a right-angled triangle where $\angle X = 90°$.

$\therefore$ Jun Wei stops at X.

5. Since m and n are positive integers,

$$m^2 + n^2 > m^2 - n^2$$

Also,

$$(m-n)^2 > 0$$
$$m^2 - 2mn + n^2 > 0$$
$$m^2 + n^2 > 2mn$$

c is the longest side in the triangle.

$$c^2 = (m^2 + n^2)$$
$$= m^4 + 2m^2n^2 + n^4$$
$$a^2 + b^2 = (m^2 - n^2)^2 + (2mn)^2$$
$$= m^4 - 2m^2n^2 + n^4 + 4m^2n^2$$
$$= m^4 + 2m^2n^2 + n^4$$

Since $c^2 = a^2 + b^2$, then the triangle is a right-angled triangle.