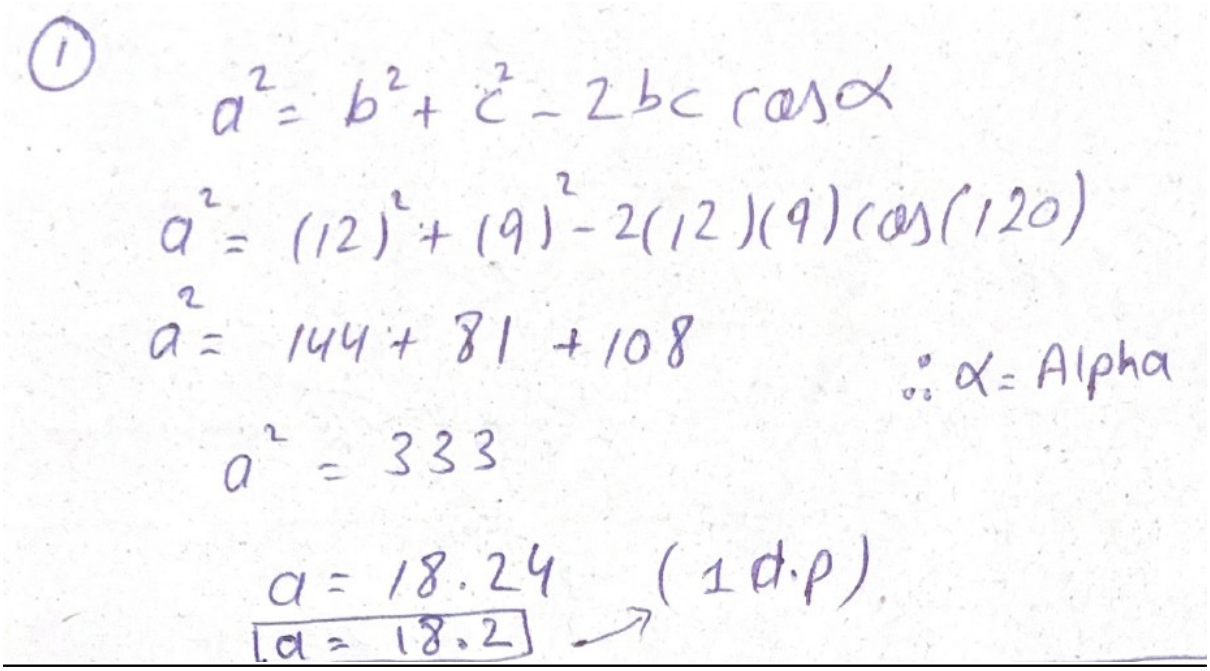
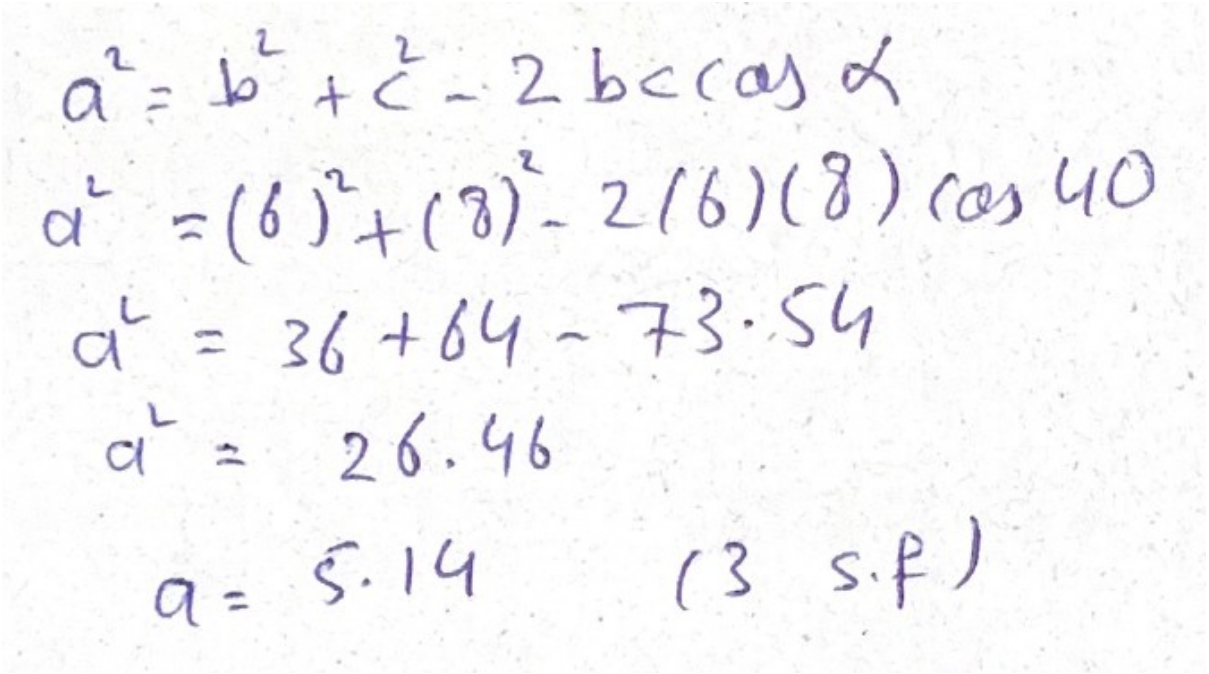
ANSWER SHEET

THE COSINE RULE

Q1-



Q2



Q3

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

$$= (14)^2 + (11)^2 - 2bc\cos\alpha$$

$$= (14)^2 + (11)^2 - 2(14)(11)\cos(15^\circ)$$

$$= 196 + 121 - 297.50$$

$$a^2 = 19.5$$

$$a = 4.41$$

$$a = 4.4 \quad (1\ dp)$$

Q4

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

$$x^2 = (5.5)^2 + (6.4)^2 - 2(5.5)(6.4)\cos(45)$$

$$= 30.25 + 40.96 - 49.78$$

$$x^2 = 21.43$$

$$x = 4.62 \quad (3\ s.f)$$

Q5

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

Re-arranging for α

$$\cos\alpha = \frac{b^2 + c^2 - a^2}{2bc}$$

$$\cos\alpha = \frac{(16)^2 + (17)^2 - (21)^2}{2(16)(17)}$$

$$\cos\alpha = \frac{256 + 289 - 441}{544}$$

$$\cos\alpha = 0.1911$$

$$\alpha = 78.9 \quad (3\ s.f)$$

$\therefore \alpha = x$

Q6

$$\cos x = \frac{(6)^2 + (10)^2 - (11)^2}{2(6)(10)} \qquad a = 11,\ b = 6,\ c = 10$$

$$\cos x = \frac{15}{120}$$

$$x = \cos^{-1}\left(\frac{15}{120}\right)$$

$$x = 83^\circ \quad \text{(Nearest degree)}$$

Q7

$$a = 25,\ b = 22,\ c = 14$$

$$\cos x = \frac{(22)^2 + (14)^2 - (25)^2}{2(22)(14)}$$

$$\cos x = \frac{484 + 196 - 625}{616}$$

$$\cos x = 0.0892$$

$$x = 84.8 \quad (1\ dp)$$

Q8

$a = 7$, $b = 5.5$, $c = 7.5$

$$\cos x = \frac{(5.5)^2 + (7.5)^2 - (7)^2}{2(5.5)(7.5)}$$

$$\cos x = \frac{30.25 + 56.25 - 49}{82.5}$$

$$\cos x = 0.4545$$

$$x = 62.9 \quad (3 \text{ S.F})$$

Q9

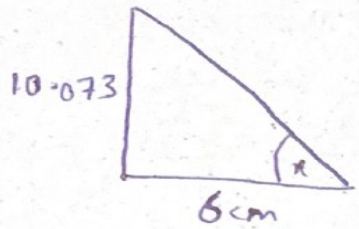
$b = 12$, $c = 15$, $\alpha = 42^\circ$ $a/y = ?$

$$y^2 = (12)^2 + (15)^2 - 2(12)(15)\cos 42$$

$$= 144 + 225 - 267.53$$

$$y^2 = 101.47$$

$$y = 10.0732$$



$$\tan x = \frac{\text{Ans}}{6}$$

$$x = \tan^{-1}\left(\frac{10.073}{6}\right)$$

$$x = 59.2^\circ \quad (1 \text{ dp})$$

Q10

$a = \sqrt{139}$, $b = (x+2)$, $c = (2x-3)$, $\alpha = 60^\circ$

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

$139 = (x+2)^2 + (2x-3)^2 - 2(x+2)(2x-3)\cos 60^\circ$

$139 = (x+2)(x+2) + (2x-3)(2x-3) - (x+2)(2x-3)$

$139 = x^2+2x+2x+4 + 4x^2-6x-6x+9 - (2x^2-3x+4x-6)$

$139 = 5x^2 - 8x + 13 - 2x^2 - x + 6$

$139 = 3x^2 - 9x + 19$

$0 = 3x^2 - 9x + 19 - 139$

$0 = 3x^2 - 9x - 120$

$0 = x^2 - 3x - 40$

$= x^2 - 8x + 5x - 40$

$= x(x-8) + 5(x-8)$

$(x+5)(x-8)$

$x = -5$, $x = 8$ $\Rightarrow$ $x = -5$ not possible as negative lenght

$\boxed{x = 8}$

Q11

(11) $a = 20\ m$, $b = 15.5\ m$, Area $= 120\ m^2$

$$\frac{1}{2}ab\sin C = 120$$

$$\frac{1}{2}(20)(15.5)\sin x = 120$$

$$310\sin x = 240$$

$$\sin x = 0.7741$$

$$x = 50.7319$$

$$y^2 = (20)^2 + (15.5)^2 - 2(15.5)(20)\cos(50.7319)$$

$$y^2 = 400 + 240.25 - 392.428$$

$$y = 15.74$$

$$y = 15.7 \quad (3\ SF)$$

Perimeter $= 20 + 15.5 + 15.7$

$= 51.2\ m$