

Patterns Question 1

Number of hours worked (n)	2	3	4	5		10
Cost (C)	49	61	73	85		145

The formula for this pattern is  $C = 12n + 25$

Patterns Question 2

Number of bars (b)	2	3	4		8
Number of chains (c)	3	6	9		21

The formula for this pattern is  $c = 3b - 3$

For  $c = 57$ ,  
 $57 = 3b - 3$ ,  
 $60 = 3b$ ,  
 $b = 20$  Julie will need 20 bars

Patterns Question 3

Number of wall brackets (w)	2	3	4	5		12
Number of pouches (p)	4	8	12	16		44

The formula for this pattern is  $p = 4w - 4$

For  $p = 76$ ,  
 $76 = 4w - 4$ ,  
 $80 = 4w$ ,  
 $w = 20$  20 wall brackets are needed.

Patterns Question 4

Number of diamonds (N)	1	2	3	4	5		10
Number of beads (B)	5	8	11	14	17		32

The formula for this pattern is  $B = 3N + 2$

Patterns Question 5

Number of rectangles (r)	2	3	4	5	6		12
Number of triangles (T)	3	5	7	9	11		23

The formula for this pattern is  $T = 2r - 1$

For a bridge with 78 triangular sections. Each side of the bridge needs 39 triangles  
 For  $T = 39$ ,  $39 = 2r - 1$ ,  $40 = 2r$ ,  $r = 20$  This means that each side of the bridge needs 20 rectangles and the bridge measures  $20 \times 2 = 40$  metres

Circles

1(a)	$A = \pi \times 1.5^2$ $A = 7.06858\dots$ Area is $7.1 \text{ cm}^2$	1(b)	$A = \pi \times 5^2$ $A = 78.53981\dots$ Area is $78.5 \text{ cm}^2$
1(c)	$A = \pi \times 0.5^2$ $A = 0.785398\dots$ Area is $0.8 \text{ cm}^2$	1(d)	$A = \pi \times 10^2$ $A = 314.15926\dots$ Area is $314 \text{ cm}^2$
2	Area of the lawn is $A = \pi \times 0.5^2 = 0.785398\dots$ , Area = $0.8 \text{ m}^2$		
3(a)	Area of semi-circle is $A = \frac{\pi \times 10^2}{2}$ $A = 157.0796\dots$ Area is $157 \text{ cm}^2$	3(b)	Area of semi-circle is $A = \frac{\pi \times 7.5^2}{2}$ $A = 88.35729\dots$ Area is $88.4 \text{ cm}^2$
3(c)	Area of semi-circle is $A = \frac{\pi \times 14.5^2}{2}$ $A = 330.25992\dots$ Area is $330 \text{ cm}^2$		
4	$A = \pi \times 10^2$ $A = 314.15926\dots$ Area is $314 \text{ cm}^2$	5	$A = \pi \times 18^2$ $A = 1017.87602\dots$ Area is $1018 \text{ cm}^2$
6	$A = \pi \times 3.5^2$ , $A = 38.5 \text{ mm}^2$ Area of 5 pins is $192.5 \text{ mm}^2$		

Pythagoras Question 1 *answers are rounded to one decimal place*

a)	$x^2 = 6^2 + 8^2$ $x^2 = 100$ $x = \sqrt{100}$ $x = 10 \text{ cm}$	b)	$x^2 = 8^2 + 15^2$ $x^2 = 289$ $x = \sqrt{289}$ $x = 17 \text{ m}$	c)	$x^2 = 7^2 + 24^2$ $x^2 = 625$ $x = \sqrt{625}$ $x = 25 \text{ mm}$
d)	$x^2 = 5^2 + 9^2$ $x^2 = 106$ $x = \sqrt{106}$ $x = 10.3 \text{ cm}$	e)	$x^2 = 8.3^2 + 12.1^2$ $x^2 = 215.3$ $x = \sqrt{215.3}$ $x = 14.7 \text{ m}$	f)	$x^2 = 2^2 + 7.9^2$ $x^2 = 66.41$ $x = \sqrt{66.41}$ $x = 8.1 \text{ cm}$

Pythagoras Question 2

a)	$8^2 = 5^2 + x^2$ $x^2 = 8^2 - 5^2$ $x^2 = 39$ $x = \sqrt{39}$ $x = 6.2 \text{ cm}$	b)	$15^2 = 8^2 + x^2$ $x^2 = 15^2 - 8^2$ $x^2 = 161$ $x = \sqrt{161}$ $x = 12.7 \text{ m}$	c)	$24^2 = 7^2 + x^2$ $x^2 = 24^2 - 7^2$ $x^2 = 527$ $x = \sqrt{527}$ $x = 23.0 \text{ mm}$
d)	$10^2 = 6^2 + x^2$ $x^2 = 10^2 - 6^2$ $x^2 = 64$ $x = \sqrt{64}$ $x = 8 \text{ cm}$	e)	$12.1^2 = 6.3^2 + x^2$ $x^2 = 12.1^2 - 6.3^2$ $x^2 = 106.72$ $x = \sqrt{106.72}$ $x = 10.3 \text{ m}$	f)	$7.9^2 = 4^2 + x^2$ $x^2 = 7.9^2 - 4^2$ $x^2 = 46.41$ $x = \sqrt{46.41}$ $x = 6.8 \text{ cm}$

Pythagoras continued

3	$c^2 = 2^2 + 1.3^2$ $c^2 = 5.69$ $c = \sqrt{5.69}$ $c = 2.385 \dots$ Rope is 2.4 metres	4	$3.3^2 = 2.1^2 + b^2$ $b^2 = 3.3^2 - 2.1^2$ $b^2 = 6.48$ $b = \sqrt{6.48}$ $b = 2.54558 \dots$ height is 2.5 metres
5	$4^2 = 1.2^2 + b^2$ $b^2 = 4^2 - 1.2^2$ $b^2 = 14.56$ $b = \sqrt{14.56}$ $b = 3.8157\dots \text{m}$ height is 3.8 metres	6	$30^2 = 27^2 + b^2$ $b^2 = 30^2 - 27^2$ $b^2 = 171$ $b = \sqrt{171}$ $b = 13.0766\dots \text{m}$ height of the kite is 13.1 metres
7	$c^2 = 3^2 + 6^2$ $c^2 = 45$ $c = \sqrt{45}$ $c = 6.7082 \dots$ Ladder is 6.7 metres	8	First shape $c^2 = 8^2 + (17 - 12)^2$ , $c^2 = 89$ $c = \sqrt{89} = 9.4$ Perimeter is $12 + 8 + 17 + 9.4 = \mathbf{46.4 \text{ m}}$  Second shape $c^2 = (12 - 7)^2 + (13 - 5)^2$ $c^2 = 5^2 + 8^2$ , $c^2 = 89$ , $c = \sqrt{89} = 9.4$ Perimeter is $9.4 + 5 + 12 + 13 + 7 = \mathbf{46.4 \text{ m}}$

SOHCAHTOA Question 1 *answers are rounded to one decimal place*

a)	$\sin 35^\circ = \frac{x}{6.8}$ $6.8 \times \sin 35^\circ = x$ $x = 3.9 \text{ cm}$	b)	$\tan 58^\circ = \frac{x}{8.1}$ $8.1 \times \tan 58^\circ = x$ $x = 13.0 \text{ m}$	c)	$\cos 57^\circ = \frac{x}{9.5}$ $9.5 \times \cos 57^\circ = x$ $x = 5.2 \text{ m}$
d)	$\tan 50^\circ = \frac{x}{8.3}$ $8.3 \times \tan 50^\circ = x$ $x = 9.9 \text{ m}$	e)	$\sin 59^\circ = \frac{x}{5.8}$ $5.8 \times \sin 59^\circ = x$ $x = 5.0 \text{ m}$	f)	$\cos 22^\circ = \frac{x}{70}$ $70 \times \cos 22^\circ = x$ $x = 64.9 \text{ m}$
g)	$\cos 33^\circ = \frac{x}{1.9}$ $1.9 \times \cos 33^\circ = x$ $x = 1.6 \text{ m}$	h)	$\sin 68^\circ = \frac{x}{5.4}$ $5.4 \times \sin 68^\circ = x$ $x = 5.0 \text{ cm}$	i)	$\sin 43^\circ = \frac{x}{8.2}$ $8.2 \times \sin 43^\circ = x$ $x = 5.6 \text{ cm}$

SOHCAHTOA Question 2

a)	$\cos x = \frac{5.2}{7.7}$ $x = \cos^{-1}\left(\frac{5.2}{7.7}\right)$ $x = 47.5^\circ$	b)	$\cos x = \frac{12.8}{29.4}$ $x = \cos^{-1}\left(\frac{12.8}{29.4}\right)$ $x = 64.2^\circ$	c)	$\tan x = \frac{2.9}{1.8}$ $x = \tan^{-1}\left(\frac{2.9}{1.8}\right)$ $x = 58.2^\circ$
d)	$\sin x = \frac{12.8}{20.7}$ $x = \sin^{-1}\left(\frac{12.8}{20.7}\right)$ $x = 38.2^\circ$	e)	$\tan x = \frac{9.3}{5.7}$ $x = \tan^{-1}\left(\frac{9.3}{5.7}\right)$ $x = 58.5^\circ$	f)	$\tan x = \frac{3}{6.5}$ $x = \tan^{-1}\left(\frac{3}{6.5}\right)$ $x = 24.8^\circ$
g)	$\cos x = \frac{4.9}{13.3}$ $x = \cos^{-1}\left(\frac{4.9}{13.3}\right)$ $x = 68.4^\circ$	h)	$\sin x = \frac{4.5}{7}$ $x = \sin^{-1}\left(\frac{4.5}{7}\right)$ $x = 40^\circ$	i)	$\tan x = \frac{1.8}{1.8}$ $x = \tan^{-1}(1)$ $x = 45^\circ$

SOHCAHTOA continued

3	$\tan 70^\circ = \frac{\text{height}}{3.6}$ $3.6 \times \tan 70^\circ = \text{height}$ <p style="text-align: center;">height is 9.9 m</p>	4	$\sin 40^\circ = \frac{\text{depth}}{120}$ $120 \times \sin 40^\circ = \text{depth}$ <p style="text-align: center;">depth is 77.1 m</p>
5	$\tan x = \frac{160}{3000}$ $x = \tan^{-1}\left(\frac{160}{3000}\right)$ $x = 3.1^\circ$ <p>Plane is on the correct glide path as <math>3^\circ \leq 3.1^\circ \leq 5^\circ</math> (the angle is between <math>3^\circ</math> and <math>5^\circ</math>)</p>	6	$\sin 24^\circ = \frac{BM}{20}$ $20 \times \sin 24^\circ = BM$ $BM = 8.13473 \dots \text{ cm}$ <p>Length of BC is <math>2 \times 8.13473 \dots = 16.2696 \dots = 16.3 \text{ cm}</math></p>