Answers

4: Geometry

4.1 Angles

1. Check point: 126°

Stretch point: 165°

2. Check point: *a* and *e*, *e* and *i*, *b* and *f*, *f* and *j*, *c* and *g*, *g* and *k*, *h* and *l*, *d* and *h*

Stretch point: 310°

3. Check point: $a = 115^\circ$, $b = 650^\circ$, $c = 115^\circ$

Stretch point: ABC = 110°

4. Check point: $j = 130^\circ$

Stretch point: 12

5. Check point: 6

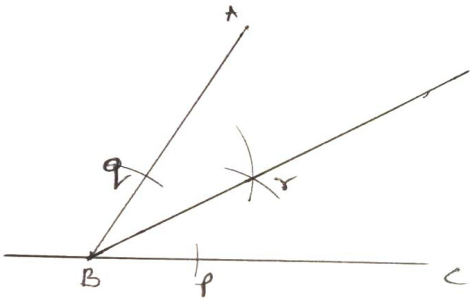
Stretch point: 3

4.2 Geometrical Construction

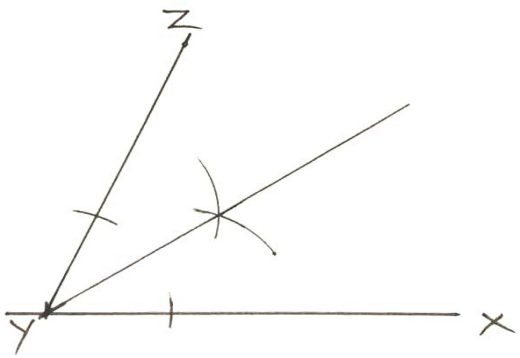
1. Check point: 90°

Stretch point: 180°

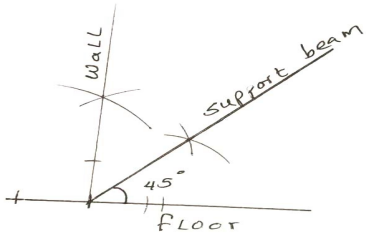
2. Check point:



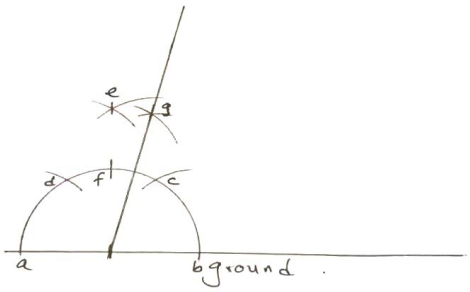
Stretch point:



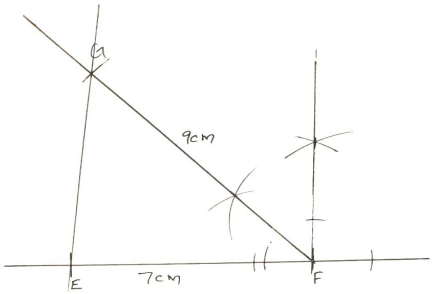
3. Check point:



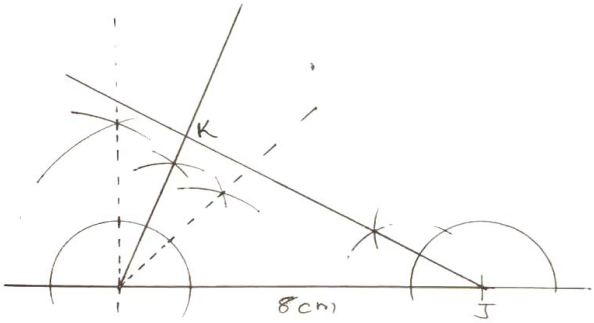
Stretch point:



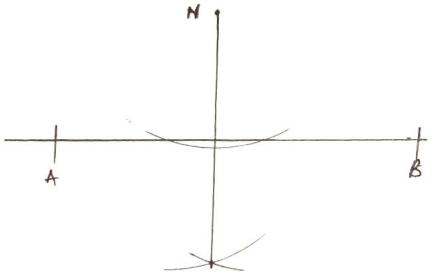
4. Check point: Angle EGF =50°



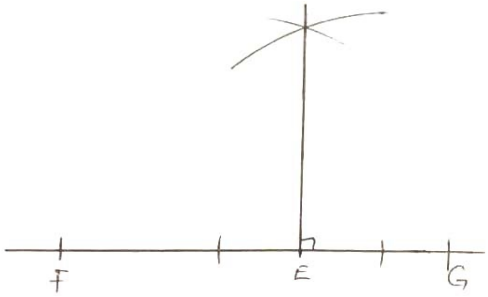
Stretch point: JK = 7.6 cm



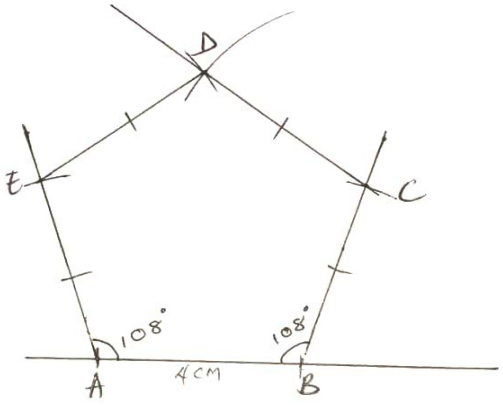
5. Check point:



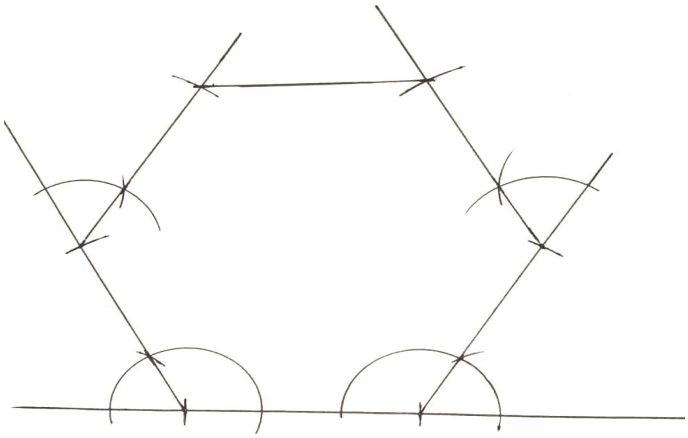
Stretch point:



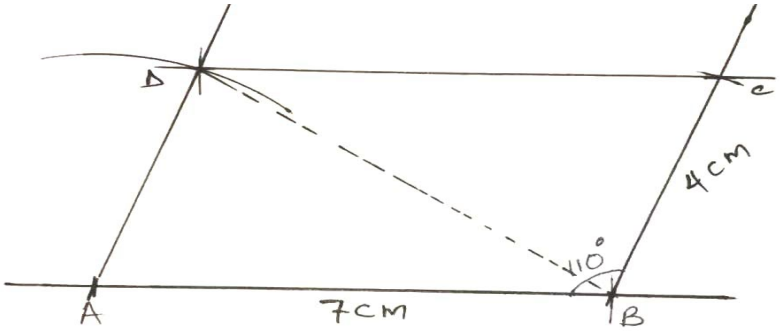
6. Check point:



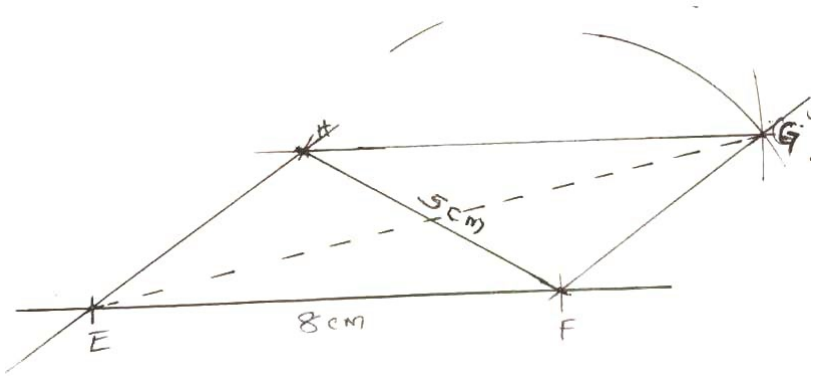
Stretch point:



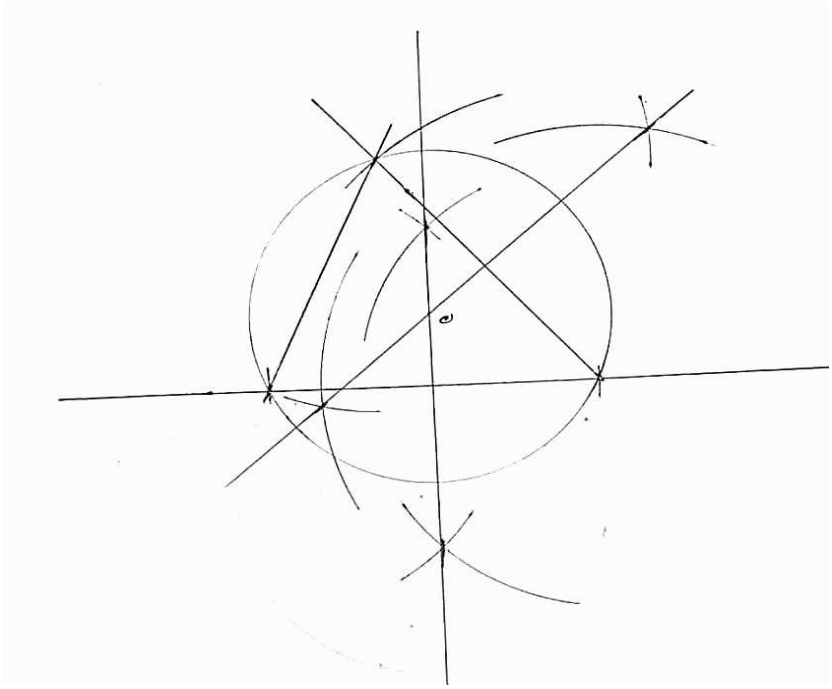
7. Check point: BD = 6.6 cm



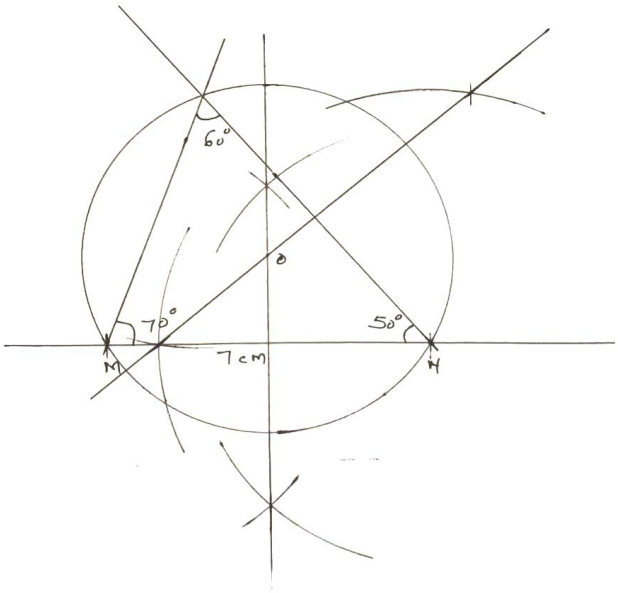
Stretch point: EG = 7.2 cm



8. Check point: Radius = 3.3 cm (1 d.p)

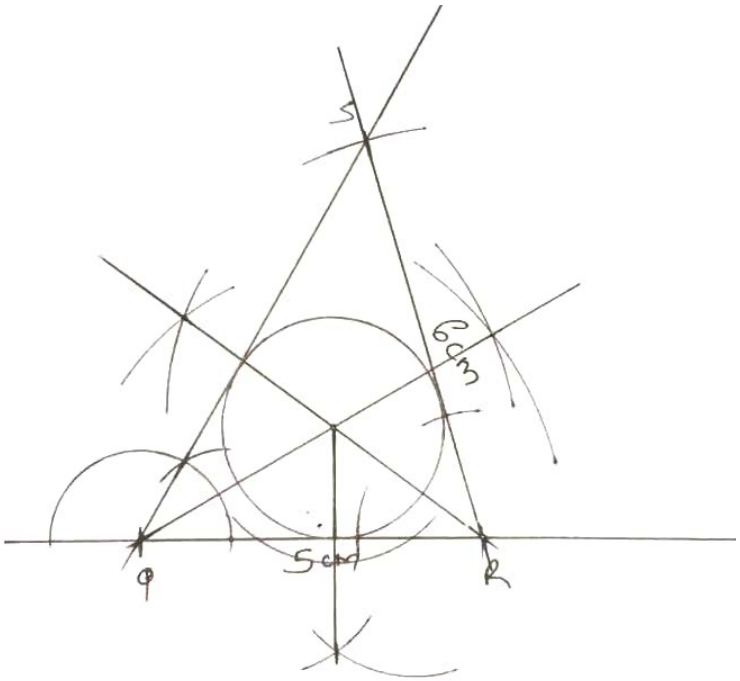


Stretch point: Diameter = 8.1 cm



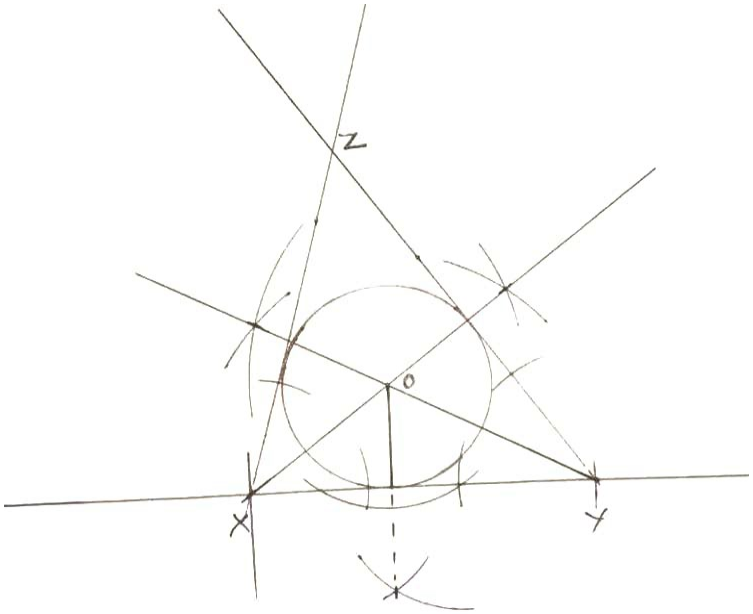
9. Check point:

(a)



(b) 3.3 cm

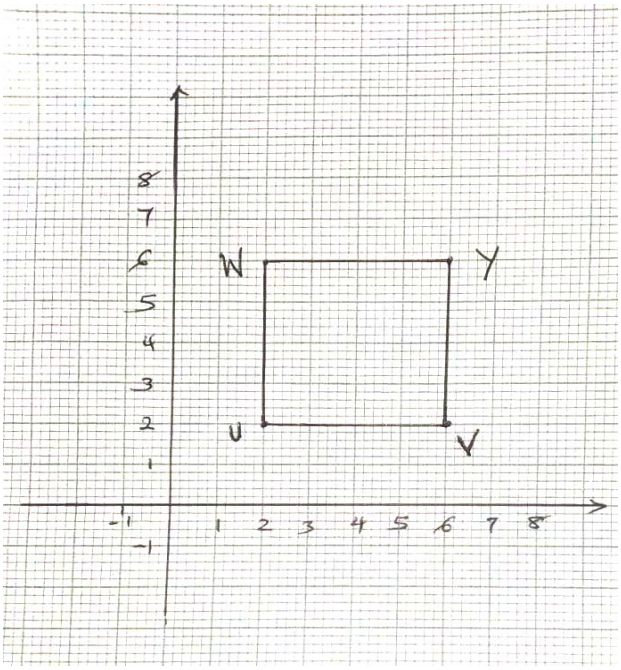
Stretch point: 10.2 cm^2



4.3 Coordinates and graphs

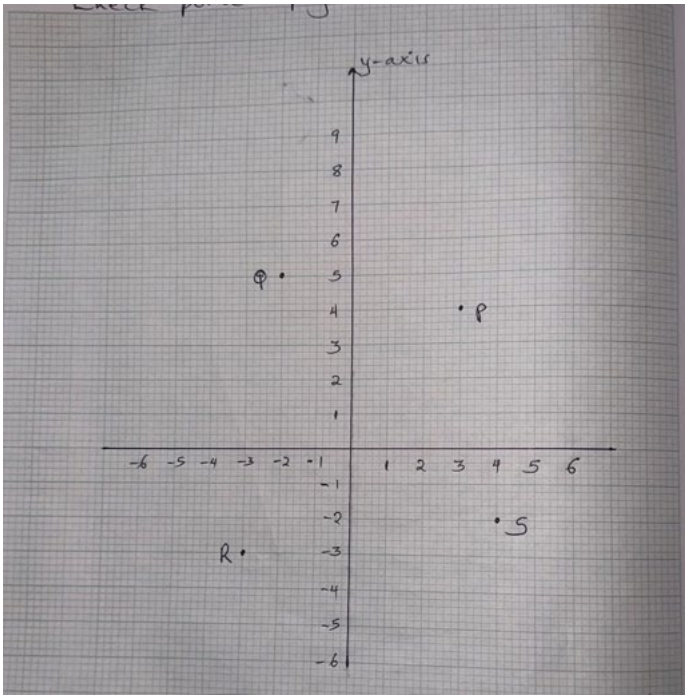
1. Check point: A(1, 3), B (4, 3), C(0, 0) , D(–4, 2) and E(–3, –3)

Stretch point: Square



2. Check point:

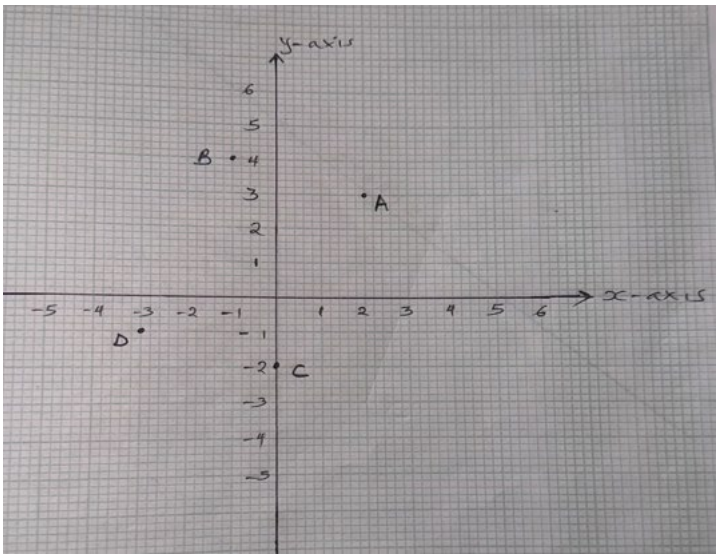
(a)



(b) P – 1st quadrant, Q – 4th quadrant, R – 3rd quadrant, S – 2nd quadrant

Stretch point:

(a)



A (1st quadrant), B (4th quadrant), C (along the *y*-axis), D (3rd quadrant)

(b) E(1, 0)

3. Check point:

$y = 4x + 5$

x	–0.5	0	0.5	1
y	3	5	7	9

$y = –2x + 5$

x	–2	–1	0	1	2
y	9	7	5	7	9

Stretch point:

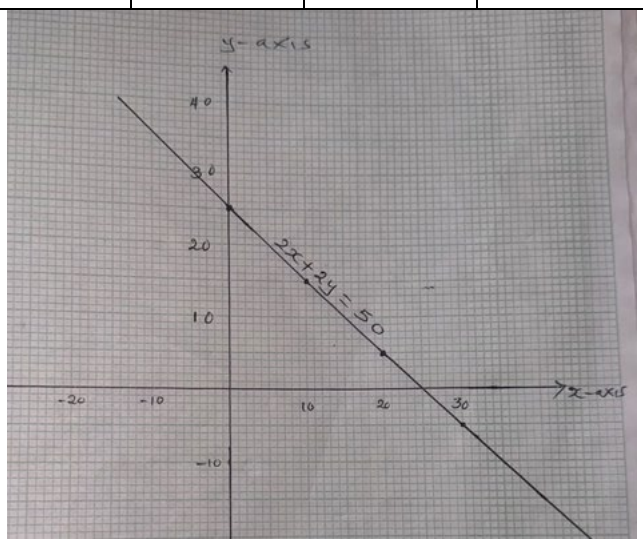
(a) $2x + y = b,$ 15

(b) $2x + y = 15$

x	0	1	2	3	4	5
y	15	13	11	9	7	5

4. Check point: $2x + 2y = 50$ or $x + y = 25$

x	0	1	2	3	4	5
y	25	24	23	22	21	20



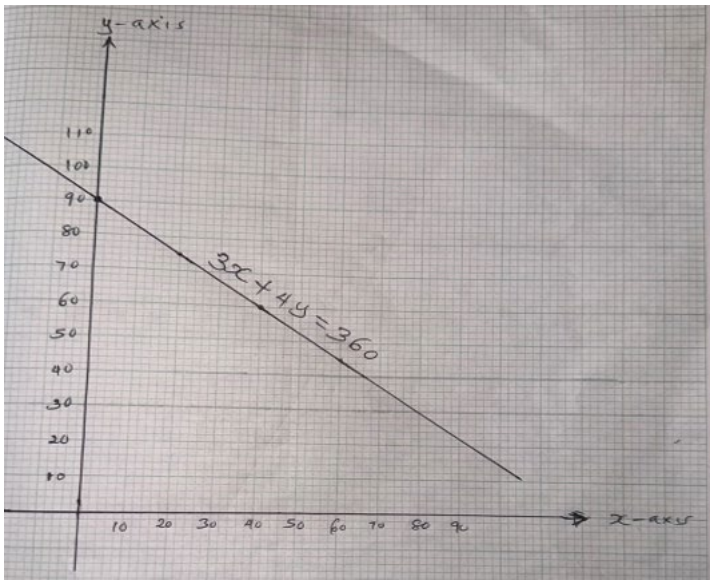
Stretch point:

(a) $3x + 4y = 360$

(b)

x	0	4	8	12
y	90	86	84	81

(c)



5. Check point:

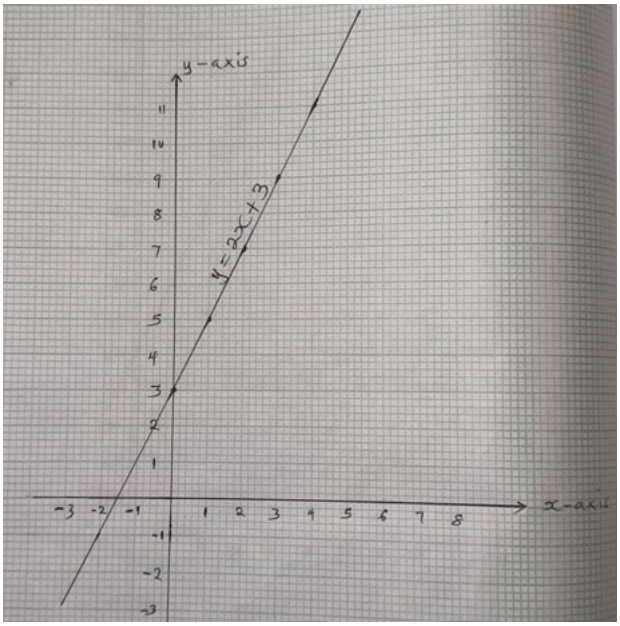
(a) $y = 2x + 3$

x	0	1	2	3	4
y	3	5	7	9	11

(b) x-axis : 1 cm represents 1 unit

y-axis : 1 cm represents 1 unit

(c)



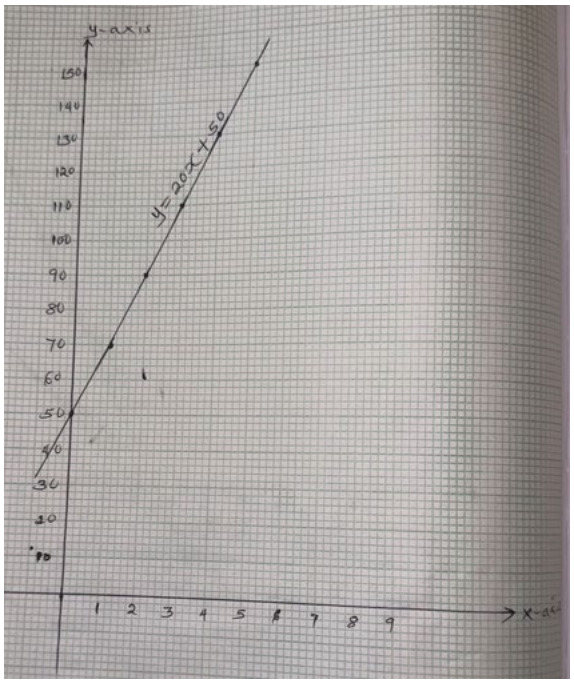
(d) $y = 3$ at (0, 3)

Stretch point:

(a) $y = 20x + 50$

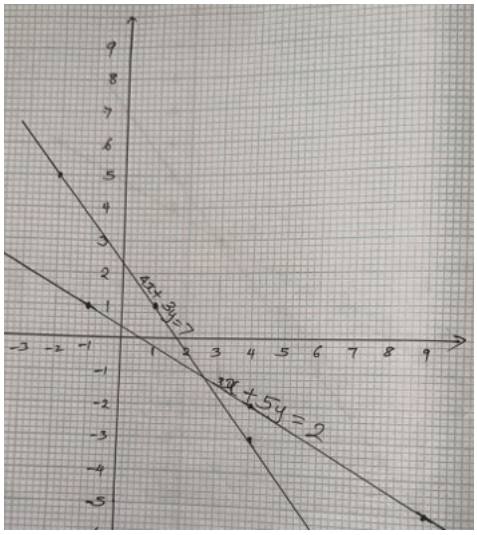
x	0	1	2	3	4	5
y	50	70	90	110	130	150

(b)



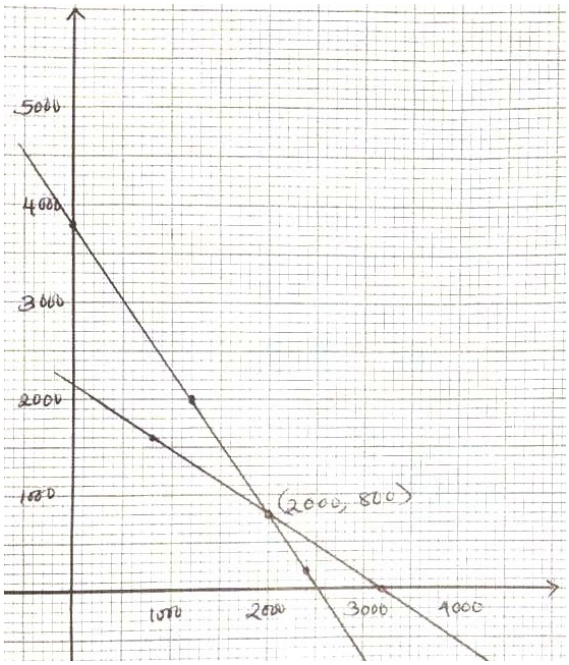
(c) KSh. 120

6. Check point:



x = 2.6 and y = –1.2

Stretch point:



Pair of trousers cost KSh. 2 000, dress costs KSh. 800

7. Check point: (a) $\frac{1}{2}$ **(b)** Gentle **(c)** 2 **(d)** CD

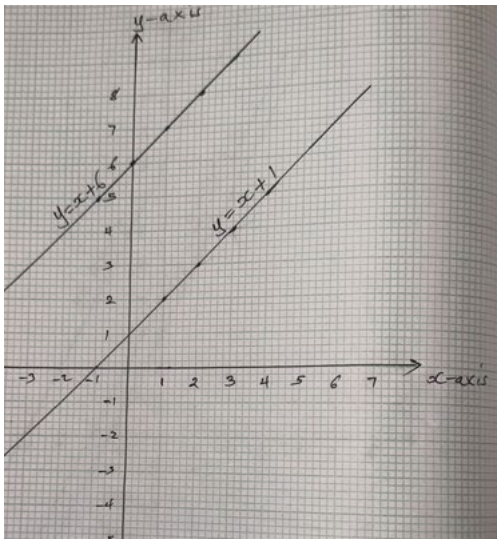
Stretch point:

(a) KL = $\frac{2}{3}$, LM = $\frac{2}{3}$ **(b)** They are on a flat area (straight line) **(c)** a =12

8. Check point:

(a) 1 **(b)** $y = x + 6$

(c)

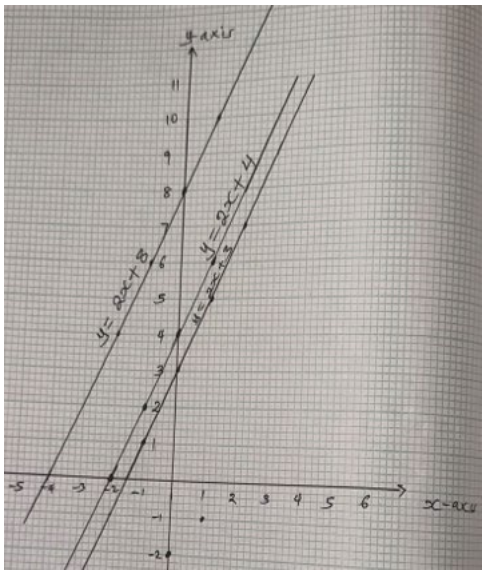


(d) y – intercepts at $x = -6$ (–6, 0) and (–1, 0) lie on x axis

Stretch point: (a) $\frac{1}{2}$: $y = 2x + 4$

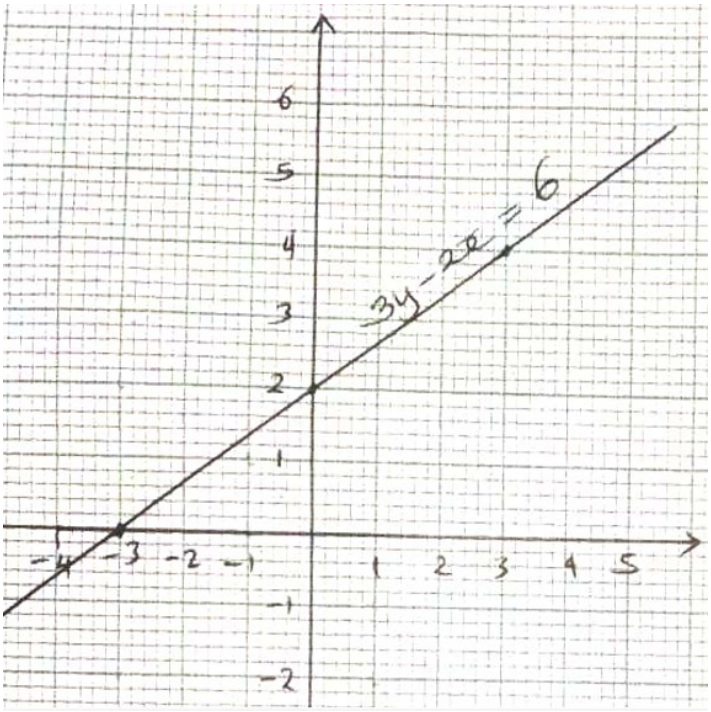
(b) L3: $y = 2x + 8$

(c)



9. Check point: (a) x-intercept = (3, 0) **(b)** y-intercept = (0, 2)

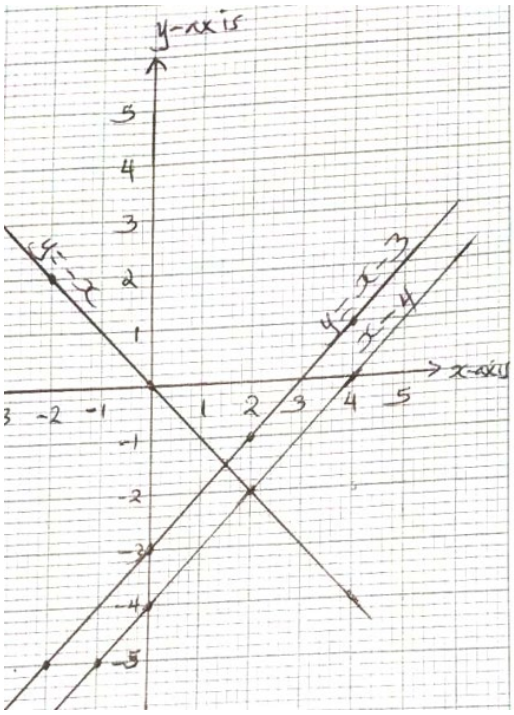
(c)



(d) $y = 4$

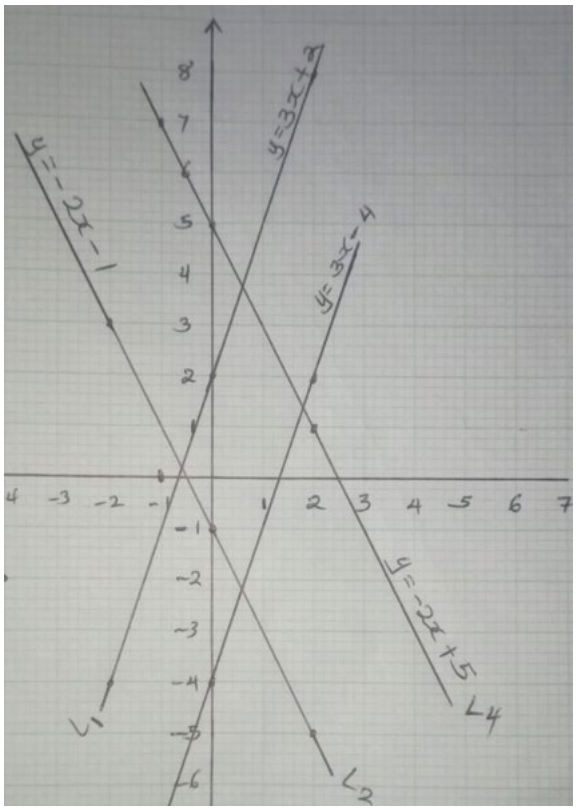
Stretch point: (a) $y = x - 4$ **(b)** $y = -x$

(c)



(d) (1.5, –1.5)

10. Check point: (a)



(b) L_1: $y = 3x + 2$, Gradient = 3

L_2: $y = -2x - 1$, Gradient = –2

L_3: $y = 3x - 4$, Gradient = 3

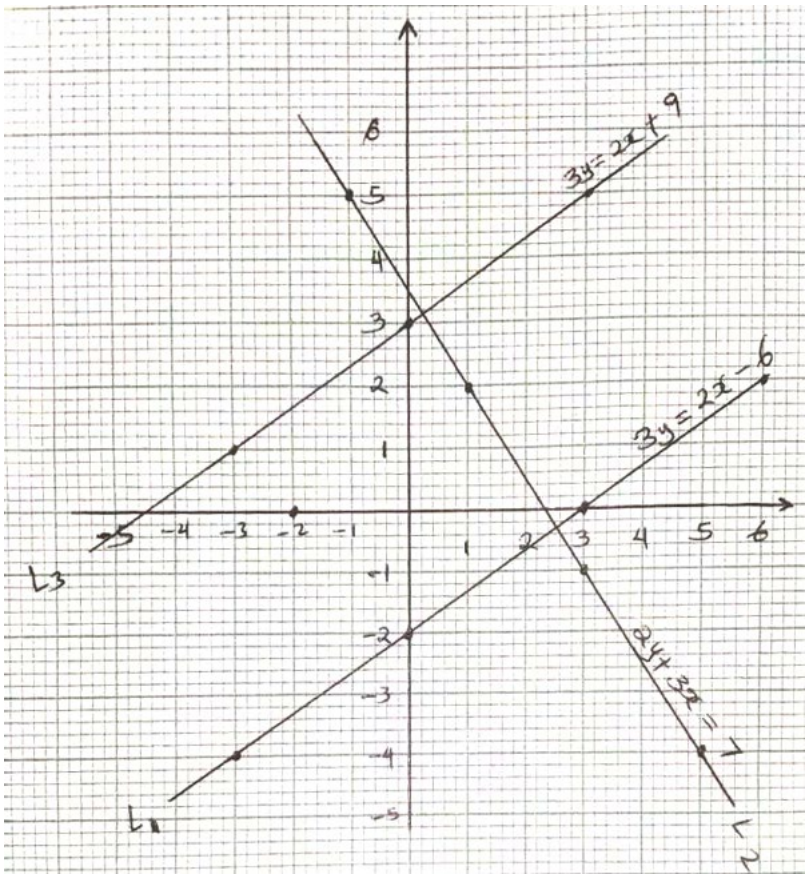
L_4: $y = -2x + 5$, Gradient = –2

Stretch point: (a) Gradient of $L_3 = \frac{2}{3}$

(b) $2y = -3x + 7$

(c) $2x - 6$

(d)

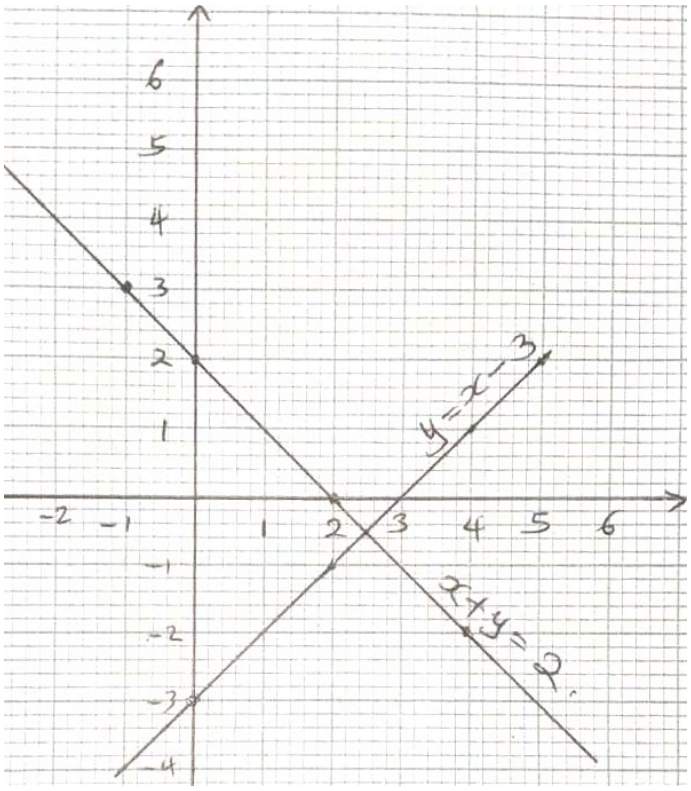


11. Check point:

(a) –1

(b) $y = x - 3$

(c)



(d) (2.5, –0.5)

Stretch point: (a) Yes **(b)** $y = x + 4$ **(c)** $y = –3 + 3$

4.4 Scale drawing

1. Check point: (a) 1 cm represents 20 cm **(b)** 40 cm

Stretch point: (a) 18.5 km **(b)** 12.5 cm

2. Check point: (a) 1:300 **(b)** 24 m

Stretch point: (a) 1:50 000

(b) $\frac{1}{50\,000}$

(c) 4.1 km

3. Check point: (a) 1 cm represents 5 km

(b) 1: 500 0000

(c) 5 cm

Stretch point: (a) 1 cm represents 1 m

(b) 4 cm **(c)** 2.5 cm

4. Check point: 50 cm

Stretch point: (a) 60 cm by 120 cm **(b)** 9 cm **(c)** 9 km

5. Check point: (a) 135°E

(b) S45°W

(c) N45°W

(d) N45°W

Stretch point: (a) (i) 030° **(ii)** 225° **(iii)** 120° **(iv)** 285°

(b) 300° **(c)** South East 310°

6. Check point:

(a) AB = 5 cm , BC = 4cm

(b) Draw the diagram using appropriate scale

(c) 900 km **(d)** 240^0 or S60° E

Stretch point:

(a) Draw the diagram using appropriate scale

(b) 5.1 cm **(c)** N45°E

7. Check point:

(a) kitchen 3 cm, classes 3.5 cm, flag post 2.5 cm

(b) Draw the diagram using appropriate scale

(c) 4 cm

Stretch point:

(a) Library 4 cm, laboratory 5.5 cm, sports field 4.5 cm and canteen 3.5 cm.

(b) Draw the diagram using appropriate scale

(c) 152 m

8. Check point:

(a) Draw the diagram using appropriate scale

(b) 9 cm **(c)** 46.55 m **(d)** 63.6 m

Stretch point:

(a) Draw the diagram using appropriate scale

(b) Drawing length: Actual length

4.1 : 82

2.6 : 51

6.6 : 131

7.7 : 155

4.8 : 97

9. Check point:

(a) Use appropriate scale to draw the diagram.

(b) 56 m **(c)** 25°

Stretch point:

(a) Use appropriate scale to draw the diagram.

(b) 34.2 m

(c) The two angles are equal because the horizontal lines through A and B are parallel making them alternate angles.

10. Check point: Area = 900 m^2

Stretch point:

(a) Drawing lengths for AB = 9.1 cm

Offsets to P, R, C, Q, S are 2.93 cm, 1.73 cm, 2.4 cm, 2.13 cm and 3.2 cm

(b) Area of farm = 20.72 ha or 207 200 m^2

4.5 Common solids

1. Check point: (a) Cuboid **(b)** Square-based pyramid **(c)** Triangular-based pyramid

Stretch point: Net of an open cone

2. Check point: Net of a square based pyramid

Stretch point: Net of a closed cone radius 3.5 cm

3. Check point:

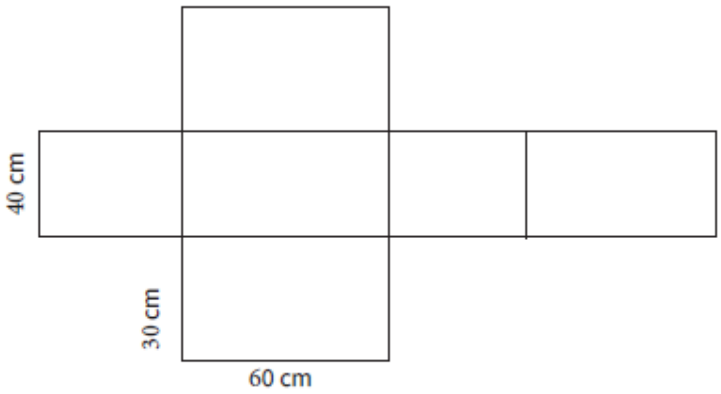
(i) Net Dimensions : 20 cm × 17 cm, 20 cm × 8 cm and 20 cm × 15 cm

(ii) 920 cm^2

Stretch point: (a) 14 cm **(b)** 3.5 cm **(c)** 192.5 cm^2

4. Check point:

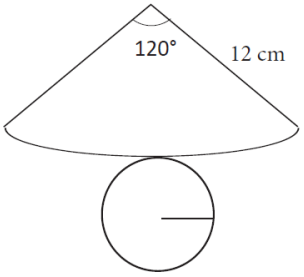
(a)



(b) 10 800 cm^2

Stretch point:

(a)



(b) 150.8 cm^2

5. Check point: 18 cm

Stretch point: KSh. 611.6

6. Check point: (a) Net of a triangular pyramid, side 4 cm **(b)** 28 cm^2

Stretch point: (a) Diagram

(b) 51 cm^2

7. Check point: 576 cm^2

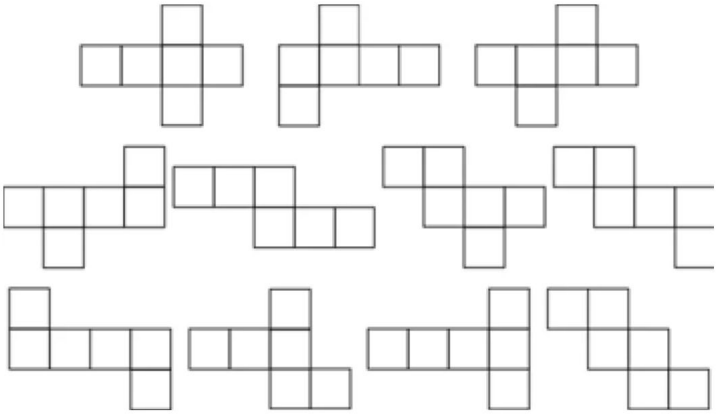
Stretch point: 108 cm^2

8. Check point: Vertices = 5, edges = 8, faces = 5

Stretch point: F + V = E + 2

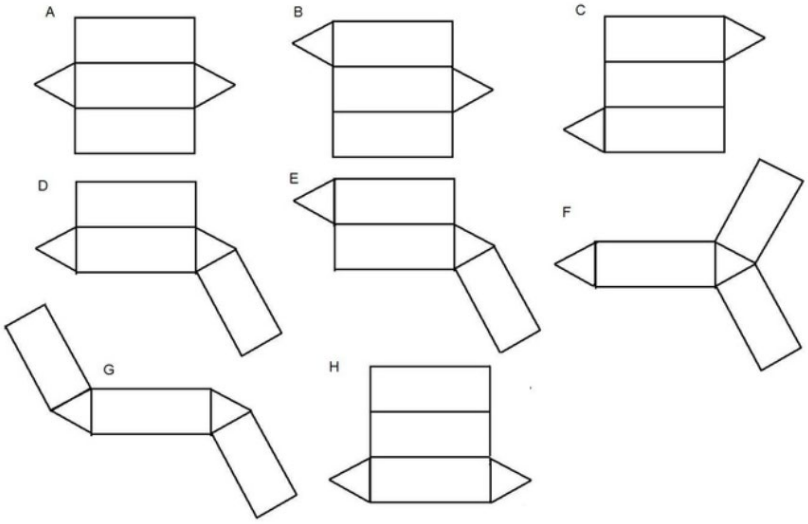
9. Check point:

Any two of these nets



Stretch point:

Any three of these nets



10. Check point: 1

Stretch point: 384

11. Check point: 6.4 cm

Stretch point: (i) 4.45 cm **(ii)** 1 232 cm^2

4.6. Similarity and Enlargement

1. Check point: (a) 22.5 m **(b)** Yes

Stretch point: x= 42.5°, yes

2. Check point: $\frac{6}{8} = \frac{9}{12}$

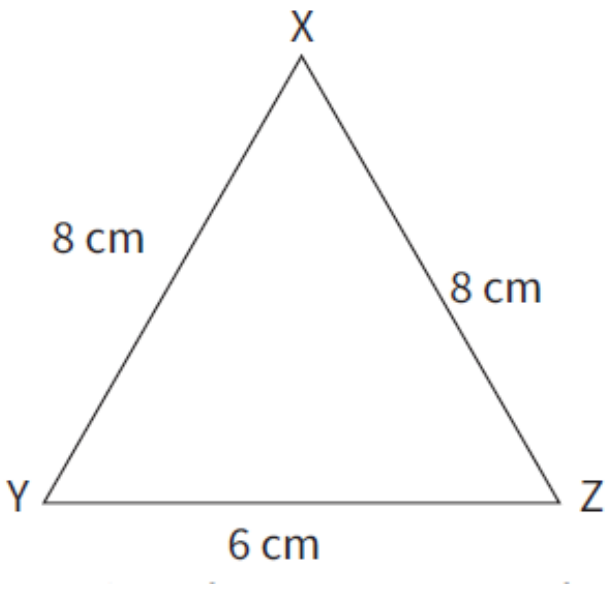
Stretch point: Corresponding lengths are not proportional

3. Check point: KL = 33.75 cm , JL = 22.5 cm

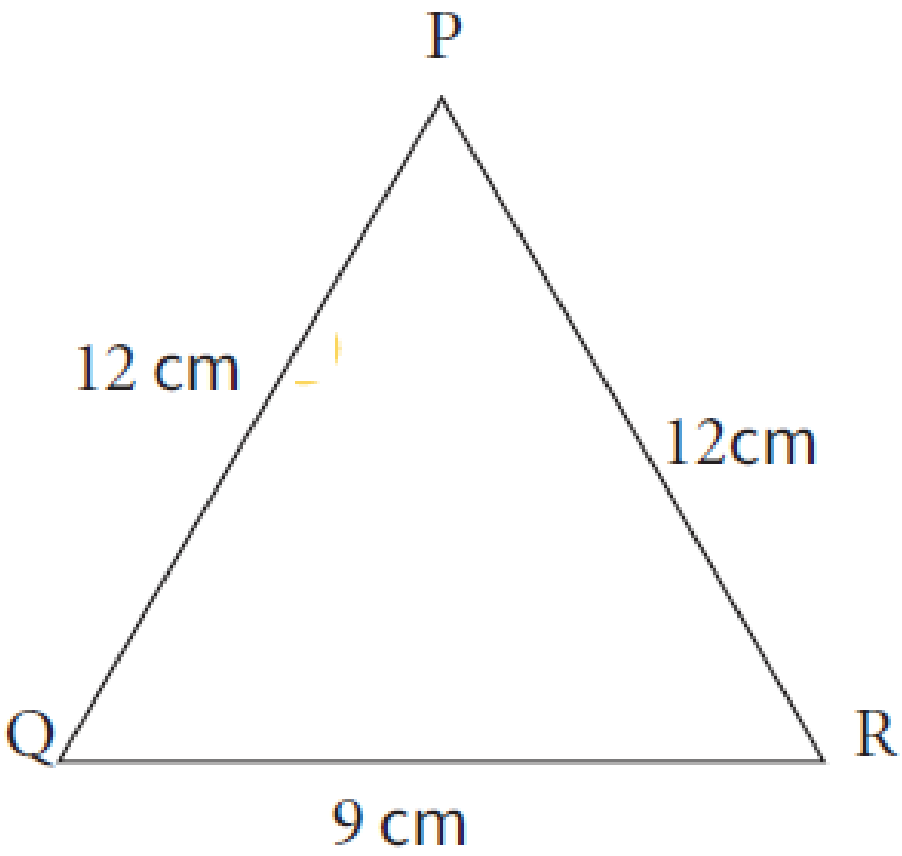
Stretch point: LB = 10 cm

4. Check point:

(a)

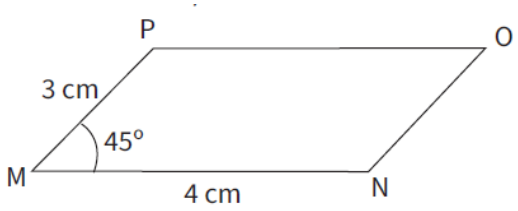


(b)

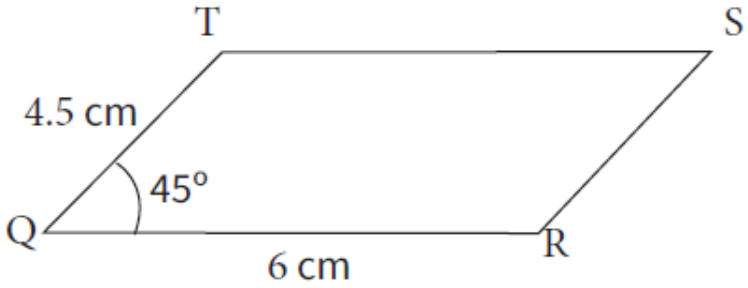


Stretch point:

(a)



(b)



(c) Area of MNOP = 4.243 cm^2, area of QRST = 9.546 cm^2

5. Check point: (a) L.S.F = $\frac{2}{3}$ **(b)** QR = 24 cm

Stretch point: 1.4 m

6. Check point: (a) 2 **(b)** $x(-2, 2)$

Stretch point: L. S.F = 2, centre is at (0, 1)

7. Check point: A'(3, 3), B'(6, 3) , C'(6, 6) and D'(3, 6)

Stretch point: P'(2, 3), Q'(–2, 3) , R'(–1, –3) S'(2, –1)

8. Check point: 180 m

Stretch point: (a) 28 cm by 42 cm **(b)** Area = 1 176 cm^2, Ratio 4:49

9. Check point: 8 m

Stretch point: ST = 4 cm

4.7 Trigonometry

1. Check point: (a) ML is opposite, KM is adjacent and KL is the hypotenuse

Stretch point: (a) 4.5 cm **(b)** 6 cm **(c)** 7.5 cm

2. Check point: (a) $\frac{3}{4}$ **(b)** $\frac{3}{5}$ **(c)** $\frac{15}{13}$

Stretch point:

(a) AC = 9.85 cm **(b)** tan BAC = $\frac{4}{9}$, tan ACB = $\frac{9}{4}$

(c) Yes, it is true. $\frac{4}{9} \times \frac{9}{4} = 1$

3. Check point:

Height up the wall is 8.39 m (2 d.p)

Distance from the wall is 4.46 m (2 d.p)

Stretch point: Yes

4. Check point: 11.37 m (2 d.p)

Stretch point: 4.95 m (2 d.p)

5. Check point: 14 .1°

Stretch point: (i) 125 m **(ii)** 25.7°

6. Check point: (a) $\frac{48}{52} = \frac{12}{13}$ **(b)** $\frac{18}{24} = \frac{3}{4}$ **(c)** $\frac{5}{9}$

Stretch point: (a) 24 cm **(b)** Sin FDE = 0.28, sin DEF = 0.96

7. Check point: (a) $\frac{6}{11} = 0.545$ **(b)** $\frac{8}{13} = 0.6154$ **(c)** $\frac{6.7}{8} = 0.8375$

Stretch point: (a) YZ = 15 cm **(b)** Sin $x = \frac{15}{17}$, tan $x = \frac{15}{8}$, cos $x = \frac{8}{17}$

8. Check point:

(a) 0.1016 **(b)** 0.5515 **(c)** 0.7333

(d) 0.1116 **(e)** 0.8878

Stretch point:

Sin $30^\circ = 0.5$, cos $60^\circ = 0.5$, sin $45^\circ = 0.7071$, cos $45^\circ = 0.7071$

9. Stretch point: $22.76^\circ = 22.8^\circ$ (1 d.p)

Stretch point: 47.5°

10. Check point: Height of pole = 27 m

Stretch point: 24.42 m

11. Check point:

(a) BC = 12.9 cm, AC = 15.3 cm **(b)** $<PQR = 53.13^\circ$

(c) DE = 14.2 cm, DE = 15.4 cm

Stretch point:

(a) AD = L tan 40° **(b)** DC = L tan 25°

(c) AC = 26.1 cm, AB = 26.11 cm (2 d.p), BC = 22.07 cm (2 d.p)

End of Strand 4 Assessment

1. 120°

2. (a) 5 sides **(b)** pentagon

3. $m = 65^\circ$

4. 90°

5. Longer diagonal = 13.1 cm

6. (a) $\frac{1}{2}$ **(b)** $y = \frac{1}{2}x + 2$ **(c)** 0.2

7. $y = 3x - 2$

y	–2	–1	0	1	2	3
x	–8	–5	–2	1	4	7

$y = -2x + 4$

y	–2	0	2	4
x	8	4	0	–4

8. (a) $\frac{3}{2}, -\frac{1}{2}$ **(b)** $m = 7$ **(c)** $2y = 3x - 4$

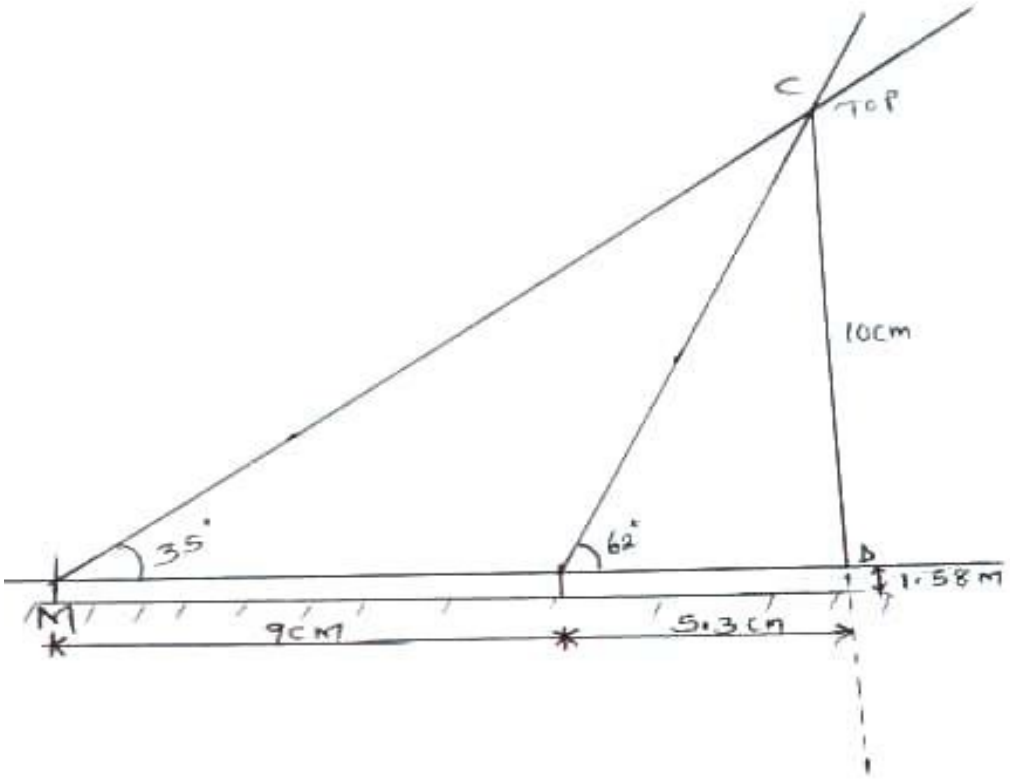
9. 6 cm

10. (a) Draw the diagram using appropriate scale

(b) 96 m

(c) 97.7 m

11. (a)



(b)

Measurement	Drawing length (cm)	Actual length (m)
Line CD – height of cliff above eye level	10.0	100
Line ND – horizontal distance, N to cliff base	5.3	53
Line MD – horizontal distance, M to cliff base	14.3	143
Height of the cliff from the ground	10.2	100 + 1.58 ≈ 101.6

12.

