

MARKING SCHEME

GRADE 10 – CORE MATHEMATICS 007 JULY

SECTION A

1.

Triangle: **3 lines of symmetry**

Octagon: **8 lines of symmetry**

2. Coordinates:

$$A(-1, -5) \rightarrow A'(3, -3)$$

Midpoint:

$$M = \left(\frac{-1+3}{2}, \frac{-5+(-3)}{2} \right) M = (1, -4)$$

Gradient of AA':

$$m = \frac{-3+5}{3+1} = \frac{2}{4} = \frac{1}{2}$$

Mirror line gradient:

$$=-2$$

Equation through (1, -4):

$$y + 4 = -2(x - 1) \quad y = -2x - 2 \quad 2x + y + 2 = 0$$

Answer:

$$2x + y + 2 = 0$$

3.

Line L_1 :

$$y = 2 - \frac{1}{3}x$$

Gradient:

$$m_1 = -\frac{1}{3}$$

Perpendicular gradient:

$$m_2 = 3$$

At y-axis:

$$x = 0, y = 2$$

Equation:

$$y - 2 = 3(x - 0) \quad y = 3x + 2$$

4.

$$25^x = 125^{2/3} \div 5^{-1}$$

Write in base 5:

$$(5^2)^x = (5^3)^{2/3} \times 5 \quad 5^{2x} = 5^2 \times 5 \quad 5^{2x} = 5^3 \quad 2x = 3 \quad x = \frac{3}{2}$$

5.

LCM of 15 and 24

$$15 = 3 \times 5 \quad 24 = 2^3 \times 3$$

LCM:

$$2^3 \times 3 \times 5 = 120$$

Minimum length = 120 cm

6.

Radius:

$$r = 10.5 \text{ cm}$$

Height of cylinder:

$$h = 30.5 - 10.5 = 20 \text{ cm}$$

Surface area in contact with water:

Curved area of cylinder:

$$2\pi rh$$

Curved area of hemisphere:

$$2\pi r^2$$

Total:

$$2\pi r(h + r)$$

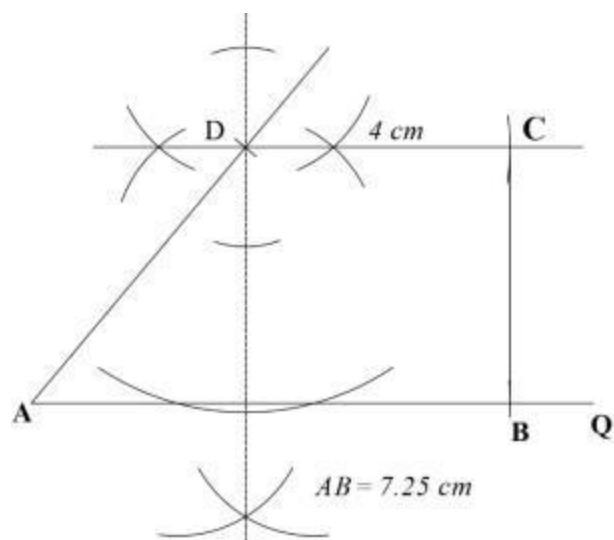
$$2\pi r(h + r)$$

$$= 2 \times \frac{22}{7} \times 10.5(20 + 10.5) = 2013cm^2$$

7.

Construction completed correctly.

$$AB \approx 7.25cm$$



8.

Arc length:

$$l = r\theta = 8 \times 1.25 = 10 \text{ cm}$$

Area:

$$\frac{1}{2}r^2\theta$$

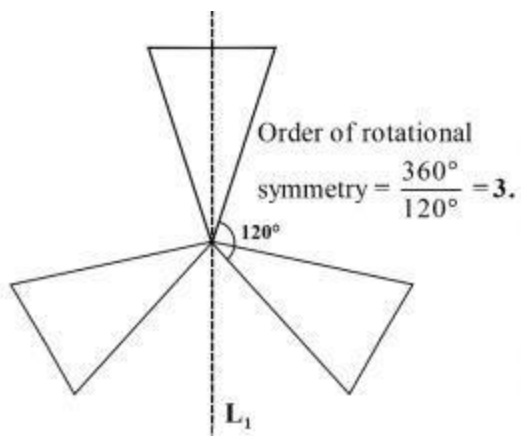
$$A = \frac{1}{2}r^2\theta$$

$$= \frac{1}{2} \times 8^2 \times 1.25 = 40 \text{ cm}^2$$

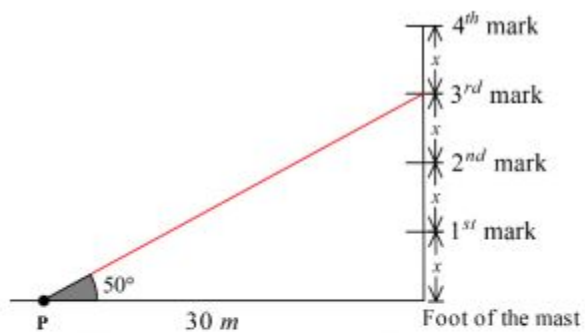
9.

Order of rotational symmetry:

3



10.



$$\tan 50^\circ = \frac{3x}{30}$$

$$3x = 30 \tan 50^\circ$$

$$x = \frac{30 \times 1.1918}{3} = 11.918\text{m}$$

$$\text{Height} = 4x$$

$$= 11.918 \times 4$$

$$= 47.672\text{m}$$

Let mast height = h

3rd mark:

$$\frac{3}{4}h \tan 50^\circ = \frac{3h/4}{30} h = \frac{30 \times 4 \tan 50^\circ}{3} h \approx 47.7m$$

11.

Data: 12, 15, 18, 12, 20, 15, 14, 12, 16

(a) Mean

$$\frac{12 + 15 + 18 + 12 + 20 + 15 + 14 + 12 + 16}{9} = \frac{134}{9} = 14.9$$

Mean = 14.9

(b) Median

Arrange data:

12, 12, 12, 14, 15, 15, 16, 18, 20

Middle number = 15

Median = 15

(c) Mode

Most frequent number = 12

Mode = 12

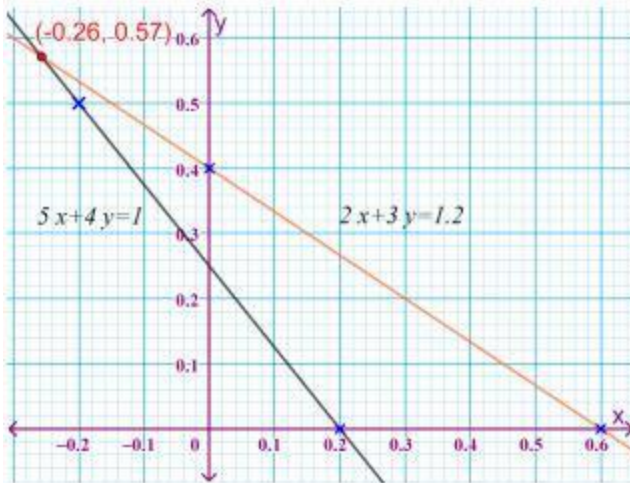
12.

$$2x + 3y = 1.2$$

x	0	0.6
y	0.4	0

$$5x + 4y = 1$$

x	-0.2	0.2
y	0.5	0

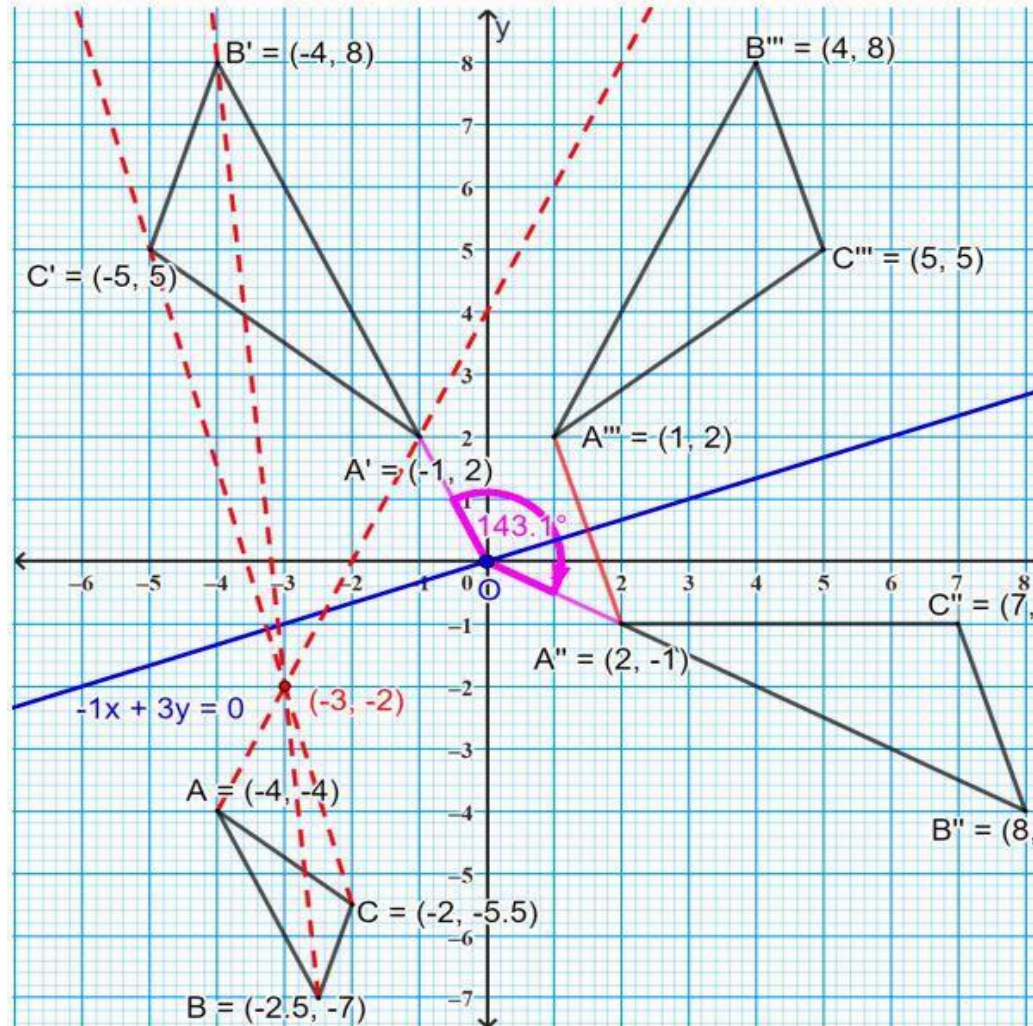


$$x = -0.26$$

$$y = 0.57$$

13.

(a)



(a) A' B' C' the image of ABC under an enlargement centre $(-3, -2)$ and (S.F.) $= -2$.

(b) A'' B'' C'' the image of A' B' C' under rotation centre O $(0, 0)$.

(i) 143.1°

(ii) Completing triangle A'' B'' C''

(c) A''' B''' C''' the image of triangle A'' B'' C'' under a reflection.

(i) Mirror line drawn in blue.

(ii)

Equation of the mirror line

Using $(6, 2)$ and $(-6, -2)$;

$$\text{Gradient, } m = \frac{2 - (-2)}{6 - (-6)} = \frac{4}{12} = \frac{1}{3}$$

y -intercept, $c = 0$

$\therefore$ using $y = mx + c$, $y = mx$ hence the eqn $y = \frac{1}{3}x$

(d) A' B' C' is mapped onto A'' B'' C'' by reflection in the y -axis (the line $x = 0$).

14.

Using cosine rule:

$$AC^2 = 5^2 + 7^2 - 2(5)(7)\cos 100^\circ$$

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$$AC = 9.3\text{km}$$

(b)

Bearing of A from C:

$$348^{\circ}$$

(c)

Bearing of B from C:

$$020^{\circ}$$

15.

Given:

$$\tan x = \frac{5}{12}$$

Triangle sides:

Opposite = 5

Adjacent = 12

Hypotenuse = 13

(a)

$$\cos x = \frac{12}{13}$$

(b)

$$\sin^2(90 - x) = \cos^2 x = \left(\frac{12}{13}\right)^2 = \frac{144}{169}$$

16.

$$(3x + 5)^2 + (\sqrt{611})^2 = (7x + 2)^2 \quad x = 4$$

Area:

$$= \frac{1}{2} \times 17 \times \sqrt{611} = 210.1 \text{ cm}^2$$

17.

$$7x - 4 \leq 9x + 2 < 3x + 14$$

First inequality:

$$-6 \leq 2x - 3 \leq x$$

Second inequality:

$$6x < 12 \quad x < 2$$

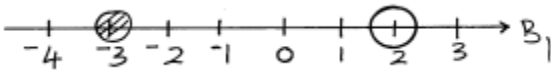
Therefore:

$$-3 \leq x < 2$$

Integral values:

$$-3, -2, -1, 0, 1$$

$$\therefore -3 \leq x \leq 2$$



18.

(a)

$$BC^2 = 50^2 + 80^2 - 2(50)(80)\cos 30^\circ \quad BC = 44\text{m}$$

(b)

$$\text{Area} = \frac{1}{2} \times 50 \times 80 \times \sin 30^\circ = 1000 \text{ m}^2 = 0.1 \text{ ha}$$

(c)

i.

Perimeter:

$$50 + 80 + 44 = 174m$$

4 strands:

$$174 \times 4 = 696m$$

ii.

$$\frac{696}{600} = 1.16$$

Complete rolls:

$$2$$

iii.

$$2 \times 4000 = Sh. 8000$$

19.

Using sine rule:

$$\frac{AC}{\sin 60^\circ} = \frac{10}{\sin 70^\circ} \quad AC = 8.66cm \quad BC = 8.91cm$$

Area:

$$= \frac{1}{2} \times 8.66 \times 8.91 \times \sin 50^\circ = 27.28cm^2$$