

ANSWERS / MARKING SCHEME

GRADE 10 – ESSENTIAL MATHEMATICS 007 JULY

SECTION A

1.

i. 25 → **Rational**

ii. π → **Irrational**

2.

$$81^{(x+1)} + 3^{4x} = 246 \quad 3^{4x}(81 + 1) = 246 \quad 82(3^{4x}) = 246 \quad 3^{4x} = 3 \quad 4x = 1 \quad x = \frac{1}{4}$$

3.

Factorize:

$$x^2 + 6x + 9 = x^2 + 3x + 3x + 9 = x(x + 3) + 3(x + 3) = (x + 3)(x + 3) = (x + 3)^2$$

4.

Area of triangle:

$$17.5 = \frac{1}{2}(3x - 2)(x + 2) \quad 35 = (3x - 2)(x + 2) \quad 35 = 3x^2 + 4x - 4 \quad 3x^2 + 4x - 39 = 0 \quad 3x^2 - 9x + 13x - 39 = 0 \quad 3x(x - 3) + 13(x - 3) = 0 \quad (3x + 13)(x - 3) = 0 \quad x = 3$$

Lengths:

$$3x - 2 = 7 \text{ cm} \quad x + 2 = 5 \text{ cm}$$

Answer: 7 cm and 5 cm

5.

Area of sector:

$$A = \frac{\theta}{360} \pi r^2$$

$$A = \frac{\theta}{360} \pi r^2$$

$$11 = \frac{\theta}{360} \times \frac{22}{7} \times 3^2 \quad 11 = \frac{\theta}{360} \times \frac{198}{7} \quad \theta = 140^\circ$$

6.

$$2^{2x-1} \times 2^{8x-4} = 2^0 \quad M1$$

$$2x-1 + 8x-4 = 0 \quad M1$$

$$10x = 5$$

$$x = \frac{1}{2} \quad A1$$

7.

$$500 \times 130 = 65,000$$

Answer: 65,000 Units

8.

Regular hexagon:

6

lines of symmetry.

9.

Total balls:

$$3 + 5 = 8$$

Probability of red:

$$\frac{3}{8}$$

10.

a.

$$\text{Diagonal} = \sqrt{200} = 14.142$$

$$h = \sqrt{8^2 - 7.071^2}$$

$$= \sqrt{14} = 3.742$$

b.

i. $\tan \theta = \frac{3.742}{5}$
 $\theta = 36.81$

ii. $\sin \theta = \frac{3.742}{8}$
 $\theta = 27.89$

c. $\tan \theta = \frac{5}{3.742}$
 $\theta = 53.19$

$$\begin{aligned} \text{Angle} &= 53.19 \times 2 \\ &= 106.38 \end{aligned}$$

11.

- a. $AB/2 = \sqrt{(8^2 - 6^2)}$
 $Ab/2 = 5.2915$
 $Ab = 5.295 \times 2$
 $= 10.58$
- b. $\text{Cos } \theta = 3/4 = 0.75$
 $\theta = 41.41$
 reflex angle $= 41.41 \times 2 = 82.82$
 $360 - 82.82$
 $= 277.18^\circ$
- c. $82.82 \times 31.42 \times 64 - 1/2 \times 64.55 \times 82.82$
 360
 $46.26 - 31.75 = 14.51$
 Area shaded
 $= 31.75 \times 2 - 14.51 \times 2$
 $= 63.5 - 29.02$
 $= 34.48$

12.

(a)

i. With replacement

$$\frac{6}{9} \times \frac{6}{9} = \frac{36}{81}$$

ii. Without replacement

$$\frac{6}{9} \times \frac{5}{8} = \frac{30}{72}$$

(b)

i. With replacement

$$\left(\frac{6}{9} \times \frac{3}{9}\right) + \left(\frac{3}{9} \times \frac{6}{9}\right) = \frac{36}{81}$$

ii. Without replacement

$$\left(\frac{6}{9} \times \frac{3}{8}\right) + \left(\frac{3}{9} \times \frac{6}{8}\right) = \frac{36}{72}$$

13.

(a) Area of hemisphere

$$2\pi r^2 = 2 \times \frac{22}{7} \times 35 \times 35 = 7700 \text{ cm}^2$$

(b) Slant height of original cone

$$\frac{L}{L-60} = \frac{35}{14} L = 100cm$$

(c) Surface area of frustrum

$$\pi RL - \pi rl = 11000 - 1760 = 9240cm^2$$

(d) Area of base

$$\frac{22}{7} \times 14^2 = 616cm^2$$

(e) Total surface area

$$7700 + 9240 + 616 = 17,556cm^2$$

14.

Triangles are similar.

$$\frac{DE}{8} = \frac{7}{4} DE = \frac{7 \times 8}{4} = 14cm$$

15.

Area ratio:

12: 108 1: 9

Linear scale factor:

1: 3

Volume scale factor:

1: 27

Volume of smaller bottle:

$$810 \times \frac{1}{27} = 30cm^3$$

16.

(a)

$$Area = \frac{1}{2} \times 10 \times (16 + 40) = 280cm^2$$

(b)

i. Length of wire

$$= \frac{150}{360} \times \frac{22}{7} \times 10.5 \times 2 = 27.5cm$$

ii. Radius of complete circle

Circumference:

$$2\pi r = 27.5 \quad r = 4.375\text{cm}$$

(c)

Outer rectangle:

$$15 \times 10 = 150\text{m}^2$$

Inner rectangle:

$$11 \times 6 = 66\text{m}^2$$

Area of path:

$$150 - 66 = 84\text{m}^2$$

