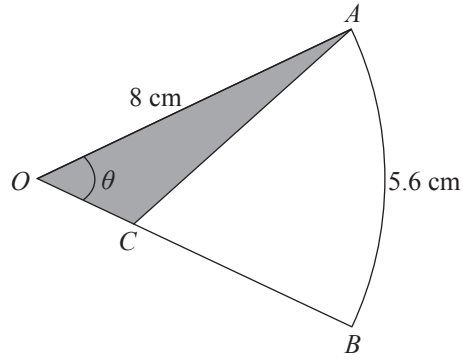
Revision Test 3

Duration: 40 minutes

20

1. In the diagram, AB is the arc of a circle centre O where arc AB = 5.6 cm, OA = 8 cm, $OB = 3OC$ and $\angle AOB = \theta$, where θ is in radian.



Calculate

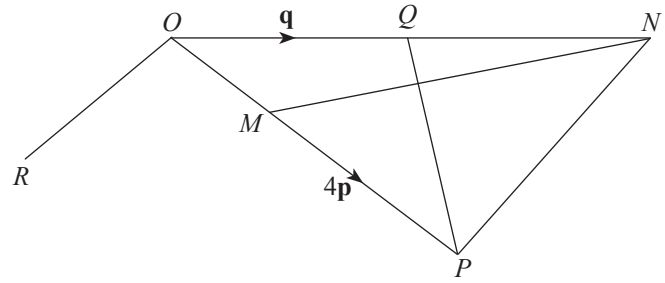
(a) the value of θ,

(b) area of unshaded region, correct to nearest cm^2.

Answer **(a)** $\theta =$ _____ [2]

(b) _____ cm^2 [3]

2. In the diagram, $\overrightarrow{OP} = 4\mathbf{p}$, $\overrightarrow{OQ} = \mathbf{q}$ and $\overrightarrow{OR} = \frac{3}{2}\mathbf{p} - \mathbf{q}$. M is the point on OP such that $\frac{OM}{PM} = \frac{1}{3}$. The line OQ is produced such that Q is the midpoint of ON.



(a) Find, in terms of **p** and/or **q**,

(i) $\overrightarrow{ON}$,

(ii) $\overrightarrow{NM}$,

(iii) $\overrightarrow{MR}$.

(b) Explain why N, M and R are collinear.

(c) Find the exact value of

(i) $\dfrac{\text{area of triangle } OMN}{\text{area of triangle } ONP}$,

(ii) $\dfrac{\text{area of triangle } ONR}{\text{area of triangle } ONP}$.

Answer **(a)(i)** $\overrightarrow{ON} =$ _____ [1]

(ii) $\overrightarrow{NM} =$ _____ [2]

(iii) $\overrightarrow{MR} =$ _____ [2]

(b) _____ [1]

(c)(i) _____ [1]

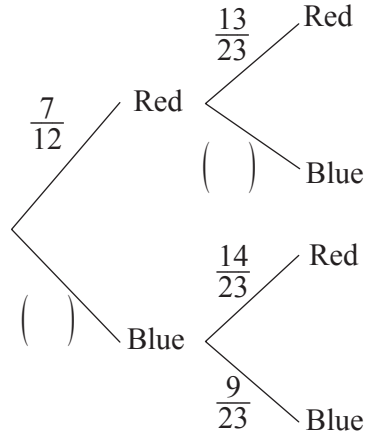
(ii) _____ [2]

3. A black box contains 24 blue balls and red balls. A ball is drawn at random from the box, the probability of selecting a red ball is $\frac{7}{12}$.

(a) Find the number of red balls in the black box.

(b) Two balls are drawn at random from the box, one after another without replacement.

(i) Complete the tree diagram. [1]



Find the probability that

(ii) the second ball drawn is red,

(iii) both balls drawn are of same colour.

Answer **(a)** _____ [1]

(b)(ii) _____ [2]

(iii) _____ [2]

–End–

Solutions to Revision Test 3

1. (a) Arc $AB = 5.6$ cm

$OA \times \theta = 5.6$

$8 \times \theta = 5.6$ [1]

$\theta = 0.7$ [1]

(b) $OC = \frac{1}{3} \times 8 = \frac{8}{3}$ cm [1]

Area of unshaded region

= area of sector OAB – area of $\triangle OAC$

$= \frac{1}{2} \times OA^2 \times \theta - \frac{1}{2} \times OA \times OC \times \sin\theta$

$= \frac{1}{2} \times 8^2 \times 0.7 - \frac{1}{2} \times 8 \times \frac{8}{3} \times \sin 0.7$ [1]

$= 16$ cm^2 [1]

2. (a) (i) $\overrightarrow{ON} = 2\overrightarrow{OQ}$

$= 2\mathbf{q}$ [1]

(ii) $\overrightarrow{OM} = \mathbf{p}$ [1]

$\overrightarrow{NM} = \overrightarrow{OM} - \overrightarrow{ON}$

$= \mathbf{p} - 2\mathbf{q}$ [1]

(iii) $\overrightarrow{MR} = \overrightarrow{OR} - \overrightarrow{OM}$

$= \frac{3}{2}\mathbf{p} - \mathbf{q} - \mathbf{p}$ [1]

$= \frac{1}{2}\mathbf{p} - \mathbf{q}$ [1]

(b) $\overrightarrow{NM} = 2\left(\frac{1}{2}\mathbf{p} - \mathbf{q}\right)$

$= 2\overrightarrow{MR}$ [1]

$\therefore N$, M and R are collinear.

(c) (i) $\frac{\text{area of triangle } OMN}{\text{area of triangle } ONP} = \frac{OM}{MP} = \frac{1}{4}$ [1]

(ii) $\frac{\text{area of triangle } ONR}{\text{area of triangle } ONM} = \frac{3}{2}$ [1]

$\frac{\text{area of triangle } ONR}{\text{area of triangle } ONP} = \frac{3}{2 \times \frac{1}{4}}$

$= 6$ [1]

3. (a) Let the number of red balls = x

$\text{P(red)} = \frac{7}{12}$

$\frac{x}{24} = \frac{7}{12}$

$x = 14$

$\therefore$ There are 14 red balls. [1]

(b) (i) $\left(\frac{10}{23}\right)$ $\left[\frac{1}{2}\right]$

$\left(\frac{5}{12}\right)$ $\left[\frac{1}{2}\right]$

(ii) $\text{P(red)} = \frac{7}{12} \times \frac{13}{23} + \frac{5}{12} \times \frac{14}{23}$ [1]

$= \frac{7}{12}$ [1]

(iii) $\text{P(same colour)} = \frac{7}{12} \times \frac{13}{23} + \frac{5}{12} \times \frac{9}{23}$ [1]

$= \frac{34}{69}$ [1]