N5 Unit 4 Solutions

Surds and Indices

Q1 $8^{\frac{5}{3}}$

$= \left(\sqrt[3]{8}\right)^5$

$= 2^5$

$= 32$

Q2 $\dfrac{n^5 \times 10n}{2n^2}$

$= \dfrac{10n^6}{2n^2}$

$= 5n^4$

Q3 $2a \times a^{-4}$

$= 2a^{-3}$

$= \dfrac{2}{a^3}$

Q4 $x^{\frac{1}{2}}\left(x^{-\frac{3}{2}} + x^{-\frac{1}{2}}\right)$

$= x^{-\frac{2}{2}} + x^0$

$= x^{-1} + x^0$

$= \dfrac{1}{x} + 1$

(b) $\dfrac{1}{6} + 1$

$= \dfrac{7}{6}$

Q5 $x^{\frac{1}{2}}\left(3x + x^{-2}\right)$

$= 3x^{\frac{3}{2}} + x^{-\frac{3}{2}}$

$= 3\sqrt{x}^3 + \dfrac{1}{\sqrt{x}^3}$

Q6 $2^0 + 3^{-1}$

$= 1 + \dfrac{1}{3}$

$= \dfrac{4}{3}$

Q7 $\sqrt{40} + 4\sqrt{10} + \sqrt{90}$

$= \sqrt{4}\sqrt{10} + 4\sqrt{10} + \sqrt{9}\sqrt{10}$

$= 2\sqrt{10} + 4\sqrt{10} + 3\sqrt{10}$

$= 9\sqrt{10}$

Q8 (a) $\sqrt{2} \times \sqrt{18}$

$= \sqrt{36}$

$= 6$

(b) $\sqrt{2} + \sqrt{18}$

$= \sqrt{2} + \sqrt{9}\sqrt{2}$

$= \sqrt{2} + 3\sqrt{2}$

$= 4\sqrt{2}$

Q9 $2\sqrt{75}$

$= 2 \times \sqrt{25}\sqrt{3}$

$= 2 \times 5\sqrt{3}$

$= 10\sqrt{3}$

Q10 $\frac{4}{\sqrt{8}}$

$\therefore \sqrt{8}$

$= \sqrt{4}\sqrt{2}$

$= 2\sqrt{2}$

$= \frac{4}{2\sqrt{2}}$

$= \frac{2}{\sqrt{2}}$

$= \frac{2\sqrt{2}}{2}$

$= \sqrt{2}$

Q11 $\frac{4}{\sqrt{6}}$

$= \frac{4\sqrt{6}}{6}$

$= \frac{2\sqrt{6}}{3}$

Algebraic Fractions

Q1 $\dfrac{(x+4)^2}{x^2-x-20}$

$= \dfrac{(x+4)(x+4)}{(x+4)(x-5)}$

$= \dfrac{x+4}{x-5}$

Q2 $\dfrac{1}{p} + \dfrac{2}{(p+5)}$

$= \dfrac{p+5+2p}{p(p+5)}$

$= \dfrac{3p+}{p(p+5)}$

Q3 $\dfrac{4}{(x+2)} - \dfrac{3}{(x-4)}$

$= \dfrac{4(x-4) - 3(x+2)}{(x+2)(x-4)}$

$= \dfrac{4x-16-3x-6}{(x+2)(x-4)}$

$= \dfrac{x-22}{(x+2)(x-4)}$

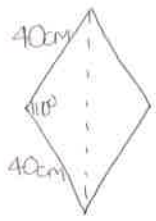
Q4 $\dfrac{5t}{s} \div \dfrac{t}{2s^2}$

$= \dfrac{5t}{s} \times \dfrac{2s^2}{t}$

$= 10s$

Trigonometry

Q1



$$\text{Area} = \frac{1}{2}ab\sin C$$

$$= \frac{1}{2} \times 40 \times 40 \times \sin 110$$

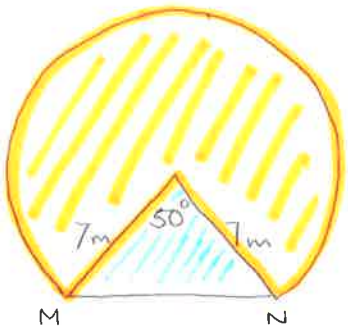
$$= 751.754\ldots$$

$$\text{Area of paving stone} = 751.754 \times 2$$

$$= 1503.508$$

$$= \underline{1503.51\ cm^2}$$

Q2



$$\underline{\text{Area of Sector}} = \frac{310}{360} \times \pi r^2$$

$$= \frac{310}{360} \times \pi \times 7^2$$

$$= 132.557\ldots$$

$$\underline{\text{Area of Triangle}} = \frac{1}{2}ab\sin C$$

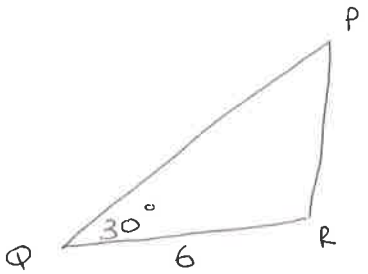
$$= \frac{1}{2} \times 7 \times 7 \times \sin 50$$

$$= 18.768\ldots$$

$$\text{Total Area} = 132.557 + 18.768$$

$$= \underline{151.325_m^2}$$

Q3



Area = $15cm^2$

$$\text{Area} = \frac{1}{2}ab\sin C$$

$$15 = \frac{1}{2} \times a \times 6 \times \sin 30$$

$$15 = 1.5 \times a$$

$$\underline{a = 10\ cm}$$

i.e. <u>the Length of PQ is 10cm</u>.

Q4

$c^2 = a^2 + b^2 - 2ab\sin C$

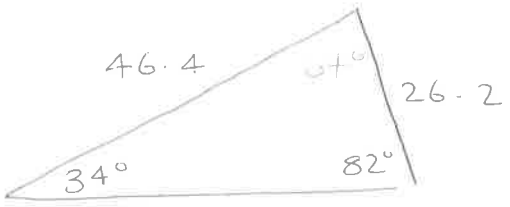
$= 1.35^2 + 1.2^2 - (2 \times 1.35 \times 1.2 \times \sin 35)$

$= 1.404\ldots$

$(\sqrt{\ }) \quad c = 1.1849\ldots$

$= \underline{1.18 \text{ km}}$

Q5



$a^2 = b^2 + c^2 - 2bc\cos A$

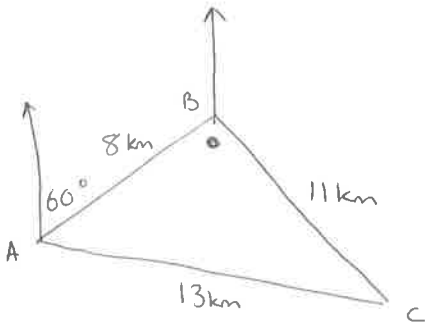
$= 46.4^2 + 26.2^2 - (2 \times 46.4 \times 26.2 \times \cos 64)$

$= 1773.561\ldots$

$(\sqrt{\ }) \quad a = 42.113\ldots$

$= \underline{42.11 \text{ m}}$

Q6



$\cos B = \dfrac{a^2 + c^2 - b^2}{2ac}$

$= \dfrac{11^2 + 8^2 - 13^2}{2(11)(8)}$

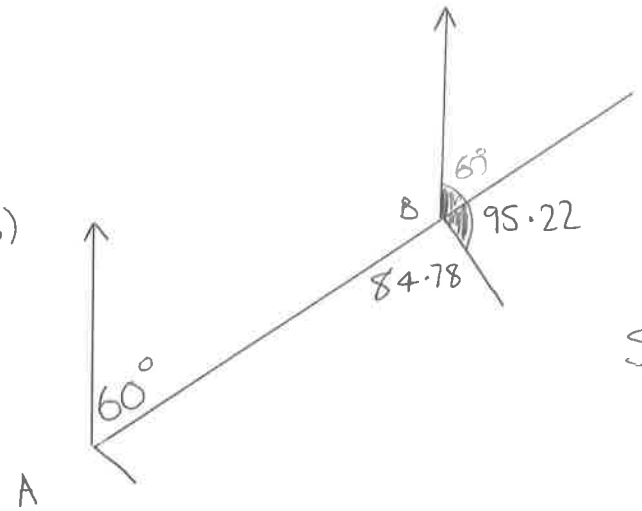
$= 0.090\ldots$

$B = \cos^{-1}(0.090\ldots)$

$= 84.784\ldots$

$= \underline{84.78^\circ}$

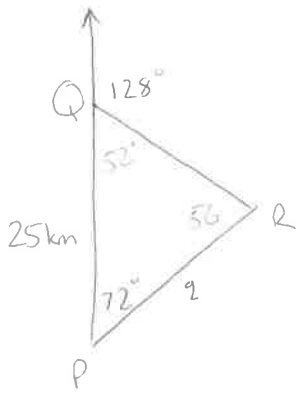
(b)



Size of shaded angle is

$60 + 95.22 = \underline{155.22^\circ}$

Q7



$$\frac{r}{\sin R} = \frac{q}{\sin Q}$$

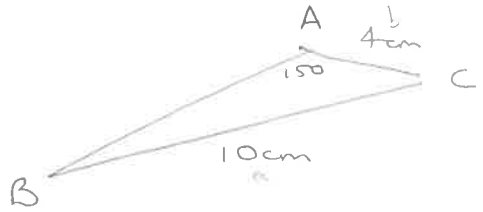
$$\frac{25}{\sin 56} = \frac{q}{\sin 52}$$

$$q = \frac{25 \sin 52}{\sin 56}$$

$$= 23.762...$$

$$= 23.76 \text{ km}$$

Q8



$$\frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\frac{10}{\sin 150} = \frac{4}{\sin B}$$

$$\frac{\sin 150}{10} = \frac{\sin B}{4}$$

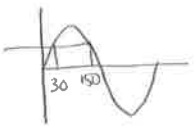
$$\sin B = \frac{4 \sin 150}{10}$$

$$\sin B = \frac{4 \times \frac{1}{2}}{10}$$

$$= \frac{2}{10}$$

$$= \frac{1}{5} \quad \text{as required}$$

∴ $\sin 30 = \sin 150 = \frac{1}{2}$



Vectors

Q1 $|\underline{u}| = \sqrt{6^2 + 13^2 + 18^2}$

$= \underline{23}$

Q2 $\underline{p} = \begin{pmatrix} -5 \\ 3 \end{pmatrix} \quad \underline{q} = \begin{pmatrix} 4 \\ -5 \end{pmatrix}$

$\underline{p} + \underline{q} = \begin{pmatrix} -5 \\ 3 \end{pmatrix} + \begin{pmatrix} 4 \\ -5 \end{pmatrix}$

$= \begin{pmatrix} -1 \\ -2 \end{pmatrix}$

Q3 $2\underline{u} - \underline{v}$

$= 2\begin{pmatrix} -2 \\ 3 \\ 5 \end{pmatrix} - \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$

$= \begin{pmatrix} -4 \\ 6 \\ 10 \end{pmatrix} - \begin{pmatrix} 0 \\ -4 \\ 7 \end{pmatrix}$

$= \begin{pmatrix} -4 \\ 10 \\ 3 \end{pmatrix}$

Q4 B is $(8, 4, 10)$

C is $(4, 0, 10)$