

2005

Question 1

Q1. (b) (i) Light travels at a speed of approximately (2.9×10^5) km/sec.

How many kilometers will light travel in 8 minutes?

Express your answer in the form $a \times 10^n$ where $n \in \mathbb{N}$ and $1 \leq a \leq 10$.

(c) (i) By rounding to the nearest whole number, estimate the value of

$$\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06} \right)^2$$

Then, evaluate $\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06} \right)^2$, correct to two decimal places.

(ii) Simplify $\sqrt{3}(2\sqrt{6} - 4\sqrt{3}) - \sqrt{10}(3\sqrt{5} - 2\sqrt{10})$,
without using a calculator.

Express your answer in the form $a + b\sqrt{2}$ where $a, b \in \mathbb{Z}$.

Solution

Q1. (b) (i) Light travels at a speed of approximately (2.9×10^5) km/sec.

How many kilometers will light travel in 8 minutes?

Express your answer in the form $a \times 10^n$ where $n \in \mathbb{N}$ and $1 \leq a \leq 10$.

$$(2.9 \times 10^5) \times 8 \times 60 = 139200000$$

$$= 1.392 \times 10^8$$

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Then, evaluate $\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06} \right)^2$, correct to two decimal places.

$$\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06} \right)^2$$

$$\left(\frac{6 + \sqrt[3]{27}}{3} \right)^2$$

$$\left(\frac{6 + 3}{3} \right)^2$$

$$3^2 = 9$$

$$\left(\frac{5.9 + \sqrt[3]{27.24}}{3.06} \right)^2$$

$$\left(\frac{5.9 + 3.00886}{3.06} \right)^2$$

$$(2.91139)^2$$

$$8.476$$

$$8.48$$

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without using a calculator.

Express your answer in the form $a + b\sqrt{2}$ where $a, b \in \mathbb{Z}$.

$$\sqrt{3}(2\sqrt{6} - 4\sqrt{3}) - \sqrt{10}(3\sqrt{5} - 2\sqrt{10})$$

$$2\sqrt{18} - 4(3) - 3\sqrt{50} + 2(10)$$

$$2\sqrt{9}\sqrt{2} - 12 - 3\sqrt{25}\sqrt{2} + 20$$

$$6\sqrt{2} - 15\sqrt{2} + 8$$

$$8 - 9\sqrt{2}$$