Q1. (a) Simplify fully $\sqrt{2}\,(\sqrt{8}-\sqrt{2}\,)$

....

....

....

Answer ....

(2)

(b) Given that $x=\sqrt{2}$ $\qquad y=\sqrt{5}$ $\qquad z=\sqrt{10}$

work out the value of $\dfrac{y}{xz}$

Write your answer in its simplest form.

....

....

....

....

Answer ....

(2)
(Total 4 marks)

Q2. (a) Simplify fully $\sqrt{75}+\sqrt{27}$

You **must** show your working.

....

....

....

....

Answer ....

(2)

(b)   Rationalise the denominator and simplify $\dfrac{21}{\sqrt{7}}$

....

....

....

Answer ....

(2)
(Total 4 marks)

Q3.   Show that $\left(\sqrt{50} - \sqrt{2}\right)^2$ is an integer.

....

....

....

....

(Total 2 marks)

Q4.   Write each of these in the form $p\sqrt{3}$, where p is an integer.

(a) $\sqrt{6} \times \sqrt{50}$

....

....

Answer ....

(2)

(b) $\sqrt{48} + \sqrt{75}$

....

....

Answer ....

(2)

(c) $\dfrac{18}{\sqrt{3}}$

....

....

Answer ....

(2)
(Total 6 marks)

Q5. (a) Work out the Highest Common Factor (HCF) of 42 and 98.

....

....

....

....

Answer ....

(2)

(b) Write $\sqrt{99} + \sqrt{44}$ in the form $a\sqrt{b}$ where a and b are integers.

....

....

Answer ....

(2)
(Total 4 marks)

Q6. (a) Simplify $(9 + \sqrt{7})(9 + \sqrt{7})$

Give your answer in the form $a + b\sqrt{7}$

....

....

....

Answer ....

(2)

(b) Prove that $\dfrac{\sqrt{12} + 6}{\sqrt{3}} \equiv 2\left(1 + \sqrt{3}\right)$

....

....

....

....

....

(4)
(Total 6 marks)

M1.   (a) $\sqrt{16} - \sqrt{4}$ (= 4 – 2)

   or $\sqrt{16} - \sqrt{2}\sqrt{2}$

   or $\sqrt{8}\sqrt{2} - \sqrt{4}$
   $\sqrt{2}(2\sqrt{2} - \sqrt{2})$
   $= \sqrt{2}(\sqrt{2})$ ***both*** *steps needed*

   or $\sqrt{2}(2\sqrt{2} - \sqrt{2})$
   $= 2\sqrt{2}\sqrt{2} - \sqrt{2}\sqrt{2}$
   Both steps needed

   M1

   2

   A1

   (b) $\dfrac{(\sqrt{5})}{\sqrt{20}}$

   $\dfrac{\sqrt{5}}{\sqrt{4}\sqrt{5}}$ *or* $\dfrac{(\sqrt{5})}{2\sqrt{5}}$ *or* $\sqrt{\dfrac{5}{20}}$ *or* $\dfrac{\sqrt{1}}{\sqrt{2}\sqrt{2}}$

   *Do **not** allow for* $\dfrac{(\sqrt{5})}{\sqrt{2}\sqrt{10}}$

   $\dfrac{\sqrt{5}}{\sqrt{2}\sqrt{10}} \times \dfrac{\sqrt{2}\sqrt{10}}{\sqrt{2}\sqrt{10}} = \dfrac{(\sqrt{5}\sqrt{2}\sqrt{10})}{20}$ **B1**

   $\dfrac{1}{2}$ *oe*

   B1

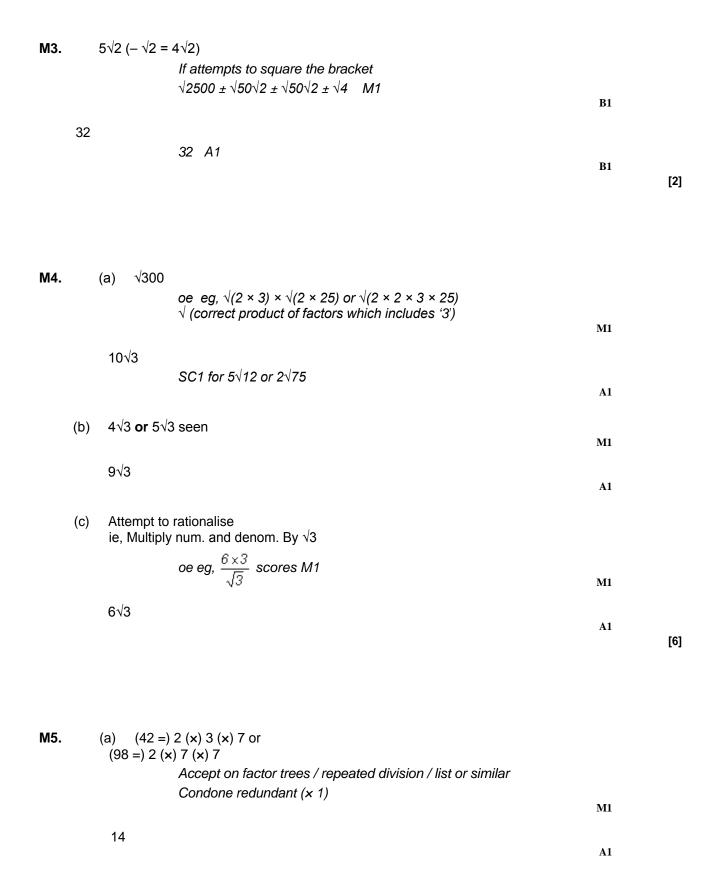   **[4]**

M2.   (a) $5\sqrt{3}$ **or** $3\sqrt{3}$

   M1

   $8\sqrt{3}$

   A1

   (b) $\dfrac{21}{\sqrt{7}} \times \dfrac{\sqrt{7}}{\sqrt{7}}$
   $\dfrac{21\sqrt{7}}{7}$

   M1

   $3\sqrt{7}$

   A1

   [4]

M3.   5√2 (– √2 = 4√2)

If attempts to square the bracket
√2500 ± √50√2 ± √50√2 ± √4   **M1**

       B1

   32

       32   *A1*

       B1

         [2]

M4.   (a)   √300

oe eg, √(2 × 3) × √(2 × 25) or √(2 × 2 × 3 × 25)
√ (correct product of factors which includes '3')   **M1**

     10√3

SC1 for 5√12 or 2√75   **A1**

   (b)   4√3 **or** 5√3 seen   **M1**

     9√3   **A1**

   (c)   Attempt to rationalise
        ie, Multiply num. and denom. By √3

oe eg, $\dfrac{6 \times 3}{\sqrt{3}}$ scores M1   **M1**

     6√3   **A1**

         [6]

M5.   (a)   (42 =) 2 (✗) 3 (✗) 7 or
        (98 =) 2 (✗) 7 (✗) 7

Accept on factor trees / repeated division / list or similar
Condone redundant (✗ 1)   **M1**

    14   **A1**

(b)   √99 = 3√11 or √44 = 2√11

M1

      5√11
                or a = 5, b = 11

A1

[4]

M6.   (a) $81 + 9\sqrt{7} + 9\sqrt{7} + \sqrt{7}\,\sqrt{7}$ or better
                  4 terms and any 3 correct

M1

      $88 + 18\sqrt{7}$
            a = 88 b = 18

A1

(b) $\dfrac{(\sqrt{12}+6)\sqrt{3}}{\sqrt{3}\sqrt{3}}$

M1

      $\dfrac{\sqrt{36}+6\sqrt{3}}{3}$

          $\dfrac{6+6\sqrt{3}}{3}$

A1

     $= 2 + 2\sqrt{3}$

M1

     $= 2(1 + \sqrt{3})$
            Strand (ii)
            Correct answer with a logical argument showing key steps

Q1

Alternate method 1

$$\frac{\sqrt{12}}{\sqrt{3}} + \frac{6}{\sqrt{3}}$$

M1

$$\sqrt{4} + \frac{6\sqrt{3}}{\sqrt{3}\sqrt{3}}$$

A1

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

M1

$$= 2(1 + \sqrt{3})$$

Strand (ii)
Correct answer with a logical argument showing key steps

Q1

Alternate method 2

$$\sqrt{12} + 6 = 2\sqrt{3}(1 + \sqrt{3})$$

M1

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

A1

$$= \sqrt{4}\ \sqrt{3} + 6$$

M1

$$12 + \sqrt{6}$$

Note: This is not a full proof

Q0

[6]