



Yr10Ext- Unit Test

NAME		DATE	
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You will be assessed on the following criteria:

Criterion A: Knowing and Understanding (*maximum 8*)

Your level:

‘The power of the absurd’

Indices, surds and scientific notation

Achievement level	Level descriptor
0	The student does not reach a standard described by any of the descriptors below
1 - 2	The student is able to: <ul style="list-style-type: none"> i. select appropriate mathematics when solving simple problems in familiar situations ii. apply the selected mathematics successfully when solving these problems iii. generally solve these problems correctly.
3 - 4	The student is able to: <ul style="list-style-type: none"> i. select appropriate mathematics when solving more complex problems in familiar situations ii. apply the selected mathematics successfully when solving these problems iii. generally solve these problems correctly.
5 - 6	The student is able to: <ul style="list-style-type: none"> i. select appropriate mathematics when solving challenging problems in familiar situations ii. apply the selected mathematics successfully when solving these problems iii. generally solve these problems correctly.
7 - 8	The student is able to: <ul style="list-style-type: none"> i. select appropriate mathematics when solving challenging problems in both familiar and unfamiliar situations ii. apply the selected mathematics successfully when solving these problems iii. generally solve these problems correctly.

Feedback:

Levels 1 - 2

1. Simplify

(a) $(5\sqrt{7})^2$

(b) $\sqrt{\frac{24}{81}}$

2. Expand and simplify:

(a) $5\sqrt{2}(6 - \sqrt{2})$

(b) $(3 - \sqrt{9})(3 + \sqrt{9})$

3. Simplify, writing your answer in scientific notation:

(a) $(7 \times 10^8) \times (3 \times 10^4)$

(b) $(2 \times 10^{-4})^3$

Levels 3 - 4

4. Evaluate:

(a) $125^{\frac{1}{3}}$

(b) $121^{-\frac{1}{2}}$

(c) $\left(\frac{1}{32}\right)^{\frac{1}{5}}$

5. Rationalise the denominator for the following:

(a) $\frac{\sqrt{5}}{\sqrt{7}}$

(b) $\frac{\sqrt{13}}{1+\sqrt{5}}$

6. Simplify the following, expressing all answers with positive indices when required:

(a) $(3x^{-2})^3$

(b) $5a^{-2}b^4 \times 7a^5b^{-6}$

(c) $\frac{(5t^4)^{-1}}{2t}$

7. Evaluate the following and give your answers in scientific notation:

(a) $\frac{7.2 \times 10^3}{8 \times 10^9}$

(b) $\frac{120000 \times 0.03}{4}$

8. Light travels 1 metre in 3.3 nanoseconds. How many seconds does light take to travel to a planet that is 4.2 billion kilometres away from the sun? Express your answer in standard form.

(1 nanosecond = 1×10^{-9} seconds)

Levels 5 - 6

9. Solve:

(a) $2^{2x-1} = 128$

(b) $5^{3x-2} = 625^x$

10. Solve the equation $2^{3x} \times 8^{2x-1} \times 16^x = 1$

11. Given that $a = 5 \times 10^{-3}$ and $b = 2 \times 10^2$, express $\frac{3}{a} - b$ in standard form.

12. It is given that $3 \times 10^3 + 2 \times 10^1 + 4 \times 10^x + 5 \times 10^y = 3024.05$. Find the values of x and y .

Levels 7 - 8

13. Every 20 minutes, a parent cell divides into two daughter cells. Starting with only one parent cell, find the number of daughter cells at the end of

(i) 1 hour

(ii) 1 day

(iv) 1 week

Write your answers in the form 2^n .

14. Given that $\frac{2\sqrt{5} - \sqrt{7}}{3\sqrt{5} + 2\sqrt{7}}$ can be expressed in the form $\frac{44 - p\sqrt{5p}}{q}$, find the value of p and of q .

15. Given that $2^{x-2} \times 3^{x+2} = 6^{2x}$, show that $6^x = 2\frac{1}{4}$.