

## Sample Question Sheet 1

No calculators allowed:

1) Convert these numbers to or from scientific notation:

a) 0.0001478    b) 1483700    c)  $5.24578 \times 10^4$     d)  $6.23 \times 10^5$     e)  $4.125 \times 10^{-3}$

2) Perform the following calculations rounding your answers to the appropriate number of *significant figures*:

a)  $8.001 + 0.2456 + 103.1$

b)  $(2.34 \times 10^2) \times 1.10$

3) Simplify the following:

a)  $\sqrt[2]{12} + 3\sqrt[2]{6} + 4\sqrt[2]{3} - \sqrt[2]{6}$

b)  $3\sqrt{18} + 5\sqrt[2]{72} - 2\sqrt[2]{50}$

4) Simplify the following:

a)  $2^3 \times 4^3$

b)  $4^4 \times 4^3 \times 4^{-8}$

c)  $\frac{6^5 \times 3^5}{2^5}$

d)  $\frac{5^{-3} \times 5^6}{5^{-7} \times 5^4}$

5) Simplify the following:

a)  $4\sqrt{2} \times 3\sqrt{5} \times 5\sqrt{10}$

b)  $3\sqrt[3]{81} \times 4\sqrt[3]{3}$

c)  $\frac{-10\sqrt{80}}{15\sqrt{5}}$

6) Expand and simplify:

a)  $(\sqrt{5} - 4)^2$

b)  $(\sqrt{20} - 3)(2 + \sqrt{20})$

7) Express the following fractions with a rational denominator:

a)  $\frac{\sqrt{3}}{6\sqrt{6}}$

b)  $\frac{3}{\sqrt{10}+1}$

9) Convert the following repeating decimals to fractions:

a) 0.132132132132...

b) 8.0474747...

c) 9.1744444...

10) Solve for x:

a)  $3x^2 + 108 = 0$

11) Simplify:

a)  $\frac{1+i}{2-i}$

b)  $2i + \frac{3-i}{1+3i}$

c)  $(\frac{1}{2} + \frac{\sqrt{3}}{2}i)^3 + i^2$

12) Simplify:

a)  $\frac{3^{k+1} \times 9^k \times 2^5}{27^k \times 4^2}$

b)  $\frac{3\sqrt{8}}{\sqrt{2}-1} + \frac{\sqrt{3}+1}{\sqrt{6}-2}$

c)  $\frac{a^2 \sqrt[3]{a^4 b^2}}{a^3 \sqrt[3]{a^7 b^4}}$

13) Suppose  $x = 53^{67} + 53^{-67}$  and  $y = 53^{67} - 53^{-67}$ . What is  $x^2 - y^2$ ?

14) Simplify the following:

a)  $\frac{x + 2\sqrt{xy} + y}{\sqrt{x} + \sqrt{y}}$

15) Suppose ABCDEF is a regular hexagon, labeled clockwise, with sides of length 4. What is the area of triangle ABC?