O Level E Maths Tutorial 1: Numbers and their operations

Syllabus :
• primes and prime factorisation

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1. List all the prime numbers less than 30.

2. Write down the prime factorisation of each of the following numbers: 4, 6, 8, 9, 10, 12, 14, 16, 18, 20.

• finding highest common factor (HCF) and lowest common multiple (LCM), squares, cubes, square roots and cube roots by prime factorisation

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3. (i) Write down the prime factorisation of 30 and 45.

(ii) Find the HCF of 30 and 45.

(iii) Find the LCM of 30 and 45.

• negative numbers, integers, rational numbers, real numbers, and their four operations
• calculations with calculator
• representation and ordering of numbers on the number line

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4. (i) State which of the following numbers are negative numbers, integers, rational numbers or real numbers.

$-2.1, -2, \frac{3}{4}, \pi, 4, 2\pi, 7.5, 8$

(ii) Show and label these numbers as points on a number line.

• use of the symbols $<$, $>$, $\leqslant$, $\geqslant$

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5. Use one of these symbols $<$, $>$, $\leqslant$, $\geqslant$ to relate the following numbers in that order.

(i) 2, π
(ii) 3, -3.1
(iii) -4, -5
(iy) -5, $-\pi$

• approximation and estimation (including rounding off numbers to a required number of decimal places or significant figures and estimating the results of computation)

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6. Approximate the following to 2 significant figures.

(i) -2.134
(ii) π
(iii) 4.78
(iv) 0.008671

• use of standard form $A \times 10^n$, where n is an integer, and $1 \leqslant A < 10$

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7. Write the following in standard form.

(i) 0.000344
(ii) 1045
(iii) -887
(iv) -0.00241

• positive, negative, zero and fractional indices

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8. Find the answers to the following:
(i) 3^4
(ii) 4^{-2}
(iii) 5^0

• laws of indices
• positive, negative, zero and fractional indices

Law 1: Multiplying indices	$a^m \times a^n = a^{m+n}$
Law 2: Dividing indices	$a^m \div a^n = a^{m-n}$
Law 3: Brackets with indices	$(a^m)^n = a^{m \times n}$
Law 4: Power of 0	$a^0 = 1$
Law 5: Negative indices	$a^{-m} = 1/a^m$
Law 6: Fractional indices	$x^{a/b} = (\sqrt[b]{x})^a$

9. Simplify:

(i) $a^2 \times a^3$

(ii) $a^2 \div a^3$

(iii) $(a^2)^3$

(iv) 2^0

(v) $1/b^3$

(vi) $(\sqrt[2]{9})^3$

10. (a) Simplify $(x^6)^{2/3}$.

(b) $3^a = 3^7 + 3^7 + 3^7$

Find the value of a.