Daily Practice _____ 2.11.2017

Q1. Round 26.28 to the nearest unit

→ 26

Q2. There are 3.06 x 10^{21} atoms in one gram of gold, how many atoms are in 500g of gold?

3.06 × 10^{21} × 500

= 1.53 × 10^{24}

Q3. What is 64.5% written as a decimal?

÷100 = 0.645

Q4. Write 30 out of 70 as a percentage

30÷70 ×100 = 42.7%

Q5. Multiply out and simplify 5(2x – 1) – 1(x – 3)

10x –5 – x+3 = 9x -2

Q6. What is the valueof V if V = p^2 – 3p when p = –5?

V=(-5)^2-(3x-5)

25+15 = 40

Today we will be learning about indices.

Indices _____

An index (pl. indices) or power represents how many times a number is being multiplied by itself.

a^b is pronounced "a to the power of b"

Examples: Find the value of

(a) 5^3 = 5x5x5
= 125

(b) 2^5 = 2x2x2x2x2
= 32

Indices _____

1. Evaluate the following

(a) 7^3 = 343   (b) 3^5 = 243 (c) 4^3 = 64   (d) 12^2 = 144   (e) 9^5 59049

(f) 2^3 x 2^2 = 2^5 (g) 3^5 x 3^4 x 3   (h) 5^3 x 5^4 (i) 10^3 x 10^3 x 10 = 10^7
32   6561   78125   10 000 000

2. Write a general rule for multiplying numbers with powers

$$x^a \times x^b = x^{a+b}$$

Indices _____

Examples: Simplify the following

(a) 4^3 x 4^7 (b)k^5 x k^4 (c) a^5 x a^7 x a   (d) d^2 x d^{-4}

Write each of the following in its simplest index form.

(a)	$3^4 \times 3^2$	**(b)**	2×2^3	**(c)**	$10^5 \times 10^2$	**(d)**	$8^3 \times 8^5$
(e)	$7^6 \times 7$	**(f)**	$5^4 \times 5^4$	**(g)**	$9^6 \times 9^2$	**(h)**	$6^8 \times 6^5$
(i)	$x^3 \times x^5$	**(j)**	$c^2 \times c^9$	**(k)**	$a^2 \times a^{12}$	**(l)**	$y^5 \times y^5$
(m)	$b^{10} \times b^{30}$	**(n)**	$p \times p^9$	**(o)**	$d^2 \times d^4$	**(p)**	$q^{11} \times q^9$

$$2p^3 \times 5p^2 = 10p^5$$

$$10p^7 \times 3p^8 \times 2p^9 =$$

Daily Practice   3.11.2017

Q1. Find the value of a house that was worth £48 000 and appreciated by
4.5%

1% of 48000 = 480   0·5% = 480÷2 = 240   1920
4% = 480   + 240
     × 4   2160
    1920   £48000 + £2160 = £50160

Q2. Multiply out and simplify $2(x - 3) + 4(x + 1)$

2x - 6 + 4x + 4
6x - 2

Q3. Solve $\frac{x+5}{3} = -1$

x + 5 = -3
x = -8

Q4. $2\frac{1}{5} \div \frac{3}{4}$

$\frac{11}{5} \times \frac{4}{3} = \frac{44}{15} = 2\frac{4}{15}$

Q5. Write 0.0000182 in scientific notation 1.82×10^{-5}

Today we will be continuing to learn how to multiply and divide
terms with powers.

Multiplying with Indices

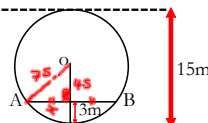Multiplying terms with powers

Examples:

1. $3a^2 \times 7a$ 2. $5a^3(2a + 4a^2)$ 3. $9a^4 \times 10a^{-3} \times a$

= $21a^3$ $10a^4 + 20a^5$ $90a^2$

4. $5a^2b \times 4b^3$

= $20a^2b^4$

1. (a) $3a^2 \times a^3$ (b) $4m^3 \times 2m^5$ (c) $5m^{-3} \times 2m^5$ (d) $7y^{10} \times 4y^2 \times 5y^{-3}$

(e) $-2k^2y \times 4y^2$ (f) $10k^2m^3 \times 6k^{-3}m^6$ (g) $2m^3 \times 7m^{-3} \times 4m^6 \times -5$

2. (i) $3a(2a + 1)$ (ii) $5a^2(6a^3 - 2a^{-2})$ (iii) $-4xy(2x^2 - 3x^5y^{-1})$

(iv) $a^{0.5}(2a^{1.5} - a^{-0.5})$ (v) $5g^2h^2(4g^{-7} - 2h^6)$

Daily Practice   6.11.2017

Q1. Calculate the value of a car that was worth £4500 and depreciated
by 7% per annum for 2 years.

4500 ÷ 100 × 7 = 315   4185 ÷ 100 × 7 = 292·95
4500 - 315 = 4185   4185 - 292·95 = £3892·05

Q2. Solve the equation $\frac{2x-5}{3} + \frac{x}{2} = 3$

$\frac{4x-10}{6} + \frac{3x}{6} = 3$

$= \frac{7x-10}{6} = 3$ 7x - 10 = 18   7x = 28   x = 4

Q3. Calculate the length of AB

$x^2 = 7.5^2 - 4.5^2$

$x^2 = 36$

$x = 6$ AB = 6 × 2 = 12m

15m
7.5   4.5
A   3m   B

**Today we will be learning to divide terms with
powers.**

Dividing with indices

Work out the following and see if you notice a pattern

(i) $6^4 \div 6^2$ (ii) $10^3 \div 10^2$ (iii) $2^7 \div 2^5$

$= 36 = 6^2$ $= 10^1$ $= 2^2$

The rule for dividing with power is

$$x^a \div x^b = x^{a-b}$$

If the x term has a <u>coefficient</u>, divide the coefficients as normal.

number in front of variable
e.g. coefficient of $7x^2$ is 7

Dividing with indices

Examples: Simplify the following

1. $7^5 \div 7^3$ 2. $m^7 \div m^3$ 3. $16m^8 \div 2m^2$

  $= 7^2$ $= m^4$ $= 8m^6$

4. $\dfrac{a^7}{a^3} = a^4$ 5. $\dfrac{12h^2}{2h^{-5}} = 6h^7$

Dividing Numbers with powers

1. Write each of the following in its simplest index form.   From Pegasys booklet

(a) $2^8 \div 2^3$ (b) $5^4 \div 5^2$ (c) $12^9 \div 12^6$ (d) $7^{11} \div 7^4$

(e) $20^5 \div 20$ (f) $8^8 \div 8^4$ (g) $3^{18} \div 3^3$ (h) $4^{15} \div 4^{13}$

(i) $x^7 \div x^2$ (j) $a^9 \div a^5$ (k) $y^{20} \div y^{10}$ (l) $b^4 \div b^1$

(m) $p^{12} \div p^{11}$ (n) $c^7 \div c^7$ (o) $q^8 \div q^2$ (p) $d^4 \div d$

(q) $\dfrac{x^9}{x^3}$ (r) $\dfrac{a^8}{a^2}$ (s) $\dfrac{m^{14}}{m}$ (t) $\dfrac{s^7}{s^7}$

(u) $\dfrac{d^{20}}{d^{12}}$ (v) $\dfrac{y^{100}}{y^{10}}$ (w) $\dfrac{t^{100}}{t}$ (x) $\dfrac{w^{10}}{w^0}$

2. (a) $\dfrac{14x^7}{2x^{-3}}$ (b) $\dfrac{36x^{15}}{12x^5}$ (c) $\dfrac{6x^9}{8x^{-3}}$ (d) $\dfrac{48x^9}{8x^9}$

(e) $\dfrac{2x^2 \times x^3 \times 6x}{4x}$ (f) $\dfrac{10x^2 \times 2x^2}{10x^{-4}}$ (g) $\dfrac{1x}{10x^{-4}}$

Daily Practice   8.11.2017

Q1. Round 41226 to 3 significant figures $\rightarrow 41200$

Q2. Multiply out and simplify 2f - 3(f - 4) $2f - 3f + 12$
                                      $-f + 12$

Q3. 45.6 x 500 $45.6 \times 5 = 228.0 \times 100 = 22800$

Q4. Write 6 000 000 in scientific notation 6×10^6

Q5. Solve $\dfrac{x-3}{2} + \dfrac{4x}{3} = 15$ $\dfrac{3x - 9 + 8x}{6} = 15$

     $\dfrac{11x - 9}{6} = 15$ $11x - 9 = 90$
                        $11x = 99$
                        $x = 9$

Today we will be learning about the power of zero and negative powers.

The power of zero

Any number to the power of zero is one.

$$a^0 = 1$$

Examples: Simplify

(i) $2x^5 \times 3x^{-5}$

$= 6x^0$

$= \underline{\underline{6}}$

(ii) $\dfrac{12p^8}{3p^8}$ $= 4p^0 = \underline{\underline{4}}$

Negative Powers

A number with a negative power is the same as 1 over the number with a positive power.

$$a^{-b} = \dfrac{1}{a^b}$$

Examples: Write with positive powers

(a) $3^{-2} = \dfrac{1}{3^2}$ (b) $4^{-3} = \dfrac{1}{4^3}$ (c) $a^{-4} = \dfrac{1}{a^4}$ (d) $3a^{-5} = \dfrac{3}{a^5}$

$\dfrac{3}{1} \times \dfrac{1}{a^5}$

(e) $\dfrac{1}{3}a^{-4} = \dfrac{1}{3a^4}$

$\dfrac{1}{3} \times \dfrac{1}{a^4}$

Negative Powers

Write the following with positive powers:

(a) k^{-1} (b) m^{-5} (c) $3m^{-3}$ (d) $2m^{-1}$ (e) $\dfrac{1}{2}m^{-1}$

$= \dfrac{1}{k}$ $= \dfrac{1}{m^5}$ $= \dfrac{3}{m^3}$ $= \dfrac{2}{m}$ $= \dfrac{1}{2m}$

(f) $\dfrac{2}{3}m^{-2}$ (g) $\dfrac{8}{3}m^{-10}$ (h) $2k^2m^{-10}$ (i) $j^{-5}h^{-7}$ (j) $10p^{-2}h^{-4}$

$\dfrac{2}{3m^2}$ $\dfrac{8}{3m^{10}}$ $= \dfrac{2k^2}{m^{10}}$ $= \dfrac{1}{j^5h^7}$ $= \dfrac{10}{p^2h^4}$

Daily Practice   9.11.2017

Q1. Write 0.0001706 in scientific notation 1.706×10^{-4}

Q2. Multiply out and simplify $7y - 2(y + 1) + 3$

$7y - 2y - 2 + 3$

$5y + 1$

Q3. Simplify $\dfrac{2k^5 \times 3k^3}{2k}$ $= \dfrac{6k^8}{2k} = 3k^7$

Q4. $2\dfrac{1}{5} \div \dfrac{15}{8}$ $= \dfrac{11}{5} \times \dfrac{8}{15} = \dfrac{88}{75} = 1\dfrac{13}{75}$

Q5. Calculate the value of a car that was worth £15 000 and depreciated by 2.4% $15000 \times 0.024 = £360$

$£14640$

Today we will be learning how to put a power to a power.

$(2^3)^7$

$(2^2)^3$ $= 2^2 \times 2^2 \times 2^2 = 2^6$

$(2^5)^3$ $= 2^5 \times 2^5 \times 2^5 = 2^{15}$

Putting a power to a power

$$(a^k)^b = a^{kb}$$

Examples:

(i) $(3^2)^5 = 3^{10}$

(ii) $(p^4)^8$
$= p^{32}$

(iii) $(4p^2)^3$ 4^3p^6

$4p^2 \times 4p^2 \times 4p^2$

$= 64p^6$

Putting a power to a power

Write each of the following in its simplest index form.

(a) $(3^2)^4$ (b) $(8^2)^2$ (c) $(10^3)^2$ (d) $(2^2)^5$

(e) $(4^5)^3$ (f) $(1^7)^2$ (g) $(12^3)^3$ (h) $(5^5)^5$

(i) $(x^4)^2$ (j) $(y^8)^5$ (k) $(a^3)^7$ (l) $(m^4)^4$

(m) $(b^3)^6$ (n) $(p^5)^3$ (o) $(k^5)^{20}$ (p) $(z^6)^0$

(q) $(3x^2)^2$ (r) $(4b^3)^4$ (s) $(10a^{-2})^5$

From Pegasys booklet

Putting a power to a power

Write each of the following in its simplest index form.

(a) $(3^2)^4 = 3^8$ (b) $(8^2)^2 = 8^4$ (c) $(10^3)^2 = 10^6$ (d) $(2^2)^5 = 2^{10}$

(e) $(4^5)^3 = 4^{15}$ (f) $(1^7)^2 = 1^{14}$ (g) $(12^3)^3 = 12^9$ (h) $(5^5)^5 = 5^{25}$

(i) $(x^4)^2 = x^8$ (j) $(y^8)^5 = y^{40}$ (k) $(a^3)^7 = a^{21}$ (l) $(m^4)^4 = m^{16}$

(m) $(b^3)^6 = b^{18}$ (n) $(p^5)^3 = p^{15}$ (o) $(k^5)^{20} = k^{100}$ (p) $(z^6)^0 = z^0 = 1$

(q) $(3x^2)^2$ (r) $(4b^3)^4$ (s) $(10a^{-2})^5$

$= 9x^4$ $256b^{12}$ $100000a^{-10}$

$= \dfrac{100000}{a^{10}}$

From Pegasys booklet

Putting a power to a power

$$\frac{\left(p^2 \times 2p \times p^3\right)^5}{p^7}$$

Simplify these expressions.

(a) $2a^3 \times 5a^5$ (b) $7x \times 9x^8$ (c) $12p^7 \div 4p^4$ (d) $50b^{12} \div 10b^6$

(e) $3y \times (2y^3)^3$ (f) $(4q^3)^2 \times 5q^4$ (g) $(4c^3)^3 \div 8c^2$ (h) $72z^{12} \div (3z^4)^2$

(i) $k^2(k^3 + k^5)$ (j) $m^5(m^2 - m^3)$ (k) $2x^4(x^3 + 3x^2)$ (l) $5a^5(2a^2 - 3a^3)$

(m) $\dfrac{x^5 \times x^4}{x^6}$ (n) $\dfrac{(m^5)^4}{m^6}$ (o) $\dfrac{5c^3 \times 4c^7}{2c^6}$ (p) $\dfrac{(3q^3)^2 \times 4q^4}{6q^7}$

(q) $\dfrac{(3xy^5)^3}{9x^2y}$ (r) $\dfrac{(2a^2b^5)^6}{(4ab)^2}$ (s) $\dfrac{(4p^4)^3}{2p^3 \times 8p^6}$ (t) $\dfrac{(2ab^3)^5}{3a^2b \times 4ab^2}$

(u) $\dfrac{x^5 \times 2x^{-3} \times 4x^2}{2x^{-8}}$ (v) $\dfrac{15x^{\frac{3}{2}} \times 4x^{-1} \times 2x^{\frac{1}{2}}}{10x^{-1}}$ (w) $\dfrac{(5x^{-4} \times 6x^{-1} \times 4x^{10})^3}{4x^2}$

Simplify these expressions.

(a) $2a^3 \times 5a^5$ (b) $7x \times 9x^8$ (c) $12p^7 \div 4p^4$ (d) $50b^{12} \div 10b^6$
$= 10a^8$ $= 63x^9$ $= 3p^3$ $= 5b^6$

(e) $3y \times (2y^3)^3$ (f) $(4q^3)^2 \times 5q^4$ (g) $(4c^3)^3 \div 8c^2$ (h) $72z^{12} \div (3z^4)^2$
$= 24y^{10}$ $80q^{10}$ $8c^7$ $8z^4$

(i) $k^2(k^3 + k^5)$ (j) $m^5(m^2 - m^3)$ (k) $2x^4(x^3 + 3x^2)$ (l) $5a^5(2a^2 - 3a^3)$
$k^5 + k^7$ $m^7 - m^8$ $2x^7 + 6x^6$ $10a^7 - 15a^8$

(m) $\dfrac{x^5 \times x^4}{x^6} = x^3$ (n) $\dfrac{(m^5)^4}{m^6} = m^{14}$ (o) $\dfrac{5c^3 \times 4c^7}{2c^6} = 10c^4$ (p) $\dfrac{(3q^3)^2 \times 4q^4}{6q^7} = 6q^3$

(q) $\dfrac{(3xy^5)^3}{9x^2y} = 3xy^{14}$ (r) $\dfrac{(2a^2b^5)^6}{(4ab)^2} = 4a^{10}b^{28}$ (s) $\dfrac{(4p^4)^3}{2p^3 \times 8p^6} = 4p^3$ (t) $\dfrac{(2ab^3)^5}{3a^2b \times 4ab^2}$

(u) $\dfrac{x^5 \times 2x^{-3} \times 4x^2}{2x^{-8}}$ (v) $\dfrac{15x^{\frac{3}{2}} \times 4x^{-1} \times 2x^{\frac{1}{2}}}{10x^{-1}}$ (w) $\dfrac{(5x^{-4} \times 6x^{-1} \times 4x^{10})^3}{4x^2}$

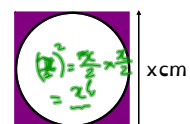$\dfrac{32a^5b^{15}}{12a^3b^3} = \dfrac{8}{3}a^2b^{12}$

Q1. Round 17183 to 2 significant figures

$\rightarrow$ 17000

Q2. The diagram shows a circle inscribed within a square.
Write down an expression for the shaded area

$A = x^2 - \left(\dfrac{x}{2}\right)^2 \times \pi$

$= x^2 - \dfrac{\pi x^2}{4}$

x cm

$\left(\dfrac{x}{2}\right)^2 = \dfrac{x^2}{4} \times \pi = \pi \dfrac{x^2}{4}$

$\dfrac{x}{2} \times \dfrac{x}{2} = \dfrac{x^2}{4}$

Q3. $\dfrac{3}{8} \times \dfrac{2}{5} = \dfrac{6}{40} = \dfrac{3}{20}$

Q4. Simplify $\dfrac{2m^2 \times 5m}{m^{-4}} = \dfrac{10m^3}{m^{-4}} = 10m^7$

Today we will be working out our questions on indices.

20 Questions Mental Maths

Today we will be completing a check-up on scientific notation and indices.

Homework Online due 20.11.2017