Name:_____ Maths Group: _____ Tutor Set: _____

Homework Booklet
KS3 Levels 3-8

Unit 10 – Integers, Powers and Roots

Remember to use the back of a page if you need more working out space.

Complete this table indicating the homework you have been set and when it is due by.

Date	Homework	Due By	Handed In

Please take care of the booklet as you will be required to make a donation to replace it if lost or damaged beyond use.

U10 – Integers, Powers and Roots
Factors and Multiples
No Calculator Allowed

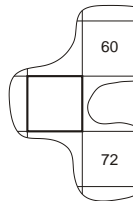1) Write down 3 different pairs of numbers that multiply together to give you 24.

___&___   ___&___   ___&___

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2) Here is part of a number grid.

a) What number is in the square **below** the number **24**?

_____

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
19	20	21	22	23	24

b) Here is another part of the **same grid**. Find the missing number.

_____

60

72

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3 a) For each number in the table, write a **multiple** of that number.
Each multiple **must** be between 100 and 130. The first one is done for you.

Number	Multiple between 100 and 130
4	120
5	
6	

b) Is 7 a **factor** of 140? Explain your answer.

_____

4a) Find the lowest common multiple of the following sets of numbers,

i) 3 and 4   =____   ii) 5 and 7 =____   iii) 6 and 5 = ____

b) Find the highest common factor of the following sets of numbers,

i) 12 and 18 =____   ii) 10 and 25 =____   iii) 14 and 21 =____

U10 – Integers, Powers and Roots
Multiples, Factors and Primes
No Calculator Allowed

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1) The numbers in the boxes are multiples of 2 because they are in the 2 times table.

| 12 | | 8 | 15 | 25 | | 30 | 27 | 16 | | 24 | | 6 |

a) Which of the numbers in the list are multiples of 4?

b) Which of the numbers in the list are multiples of both
   i.   2 and 4

   ii.   3 and 5

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2) The number 6 has four factors 1, 2, 3 and 6.
   What are the factors of 12?

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3) None of these numbers are prime numbers: 1245   418   123   316.
   Explain how you can tell.

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1) Find the Highest Common Factor (HCF) of:

   a) 9 and 15

   b) 9 and 36

   c) 20 and 36

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2) Find the lowest common multiple (LCM) of:

   a) 9 and 5

   b) 9 and 6

   c) 20 and 15

6) Find the prime factorisation of:

a) 15   b) 36   c) 124

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Multiples, Factors and Primes
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Section A

1) Find the Lowest Common Multiple (LCM) of:

   a) 4 and 5

   b) 4 and 6

   c) 5 and 6

2) Find the Highest Common Factor (HCF) of:

   a) 9 and 15

   b) 9 and 36

   c) 20 and 36

Section B

1) Find the lowest common multiple of 2, 5 and 8

2) Find the highest common factor of 18, 30 and 48

Section C

Produce a factor tree to find the prime factors of the following.

   1) 36   2) 60   3)216

Two lighthouses can be seen from the top of a hill. The first flashes once very 8 seconds and the other flashes once every 15 seconds. If they flash simultaneously, how long is it until they flash again at the same time?

U10 – Integers, Powers and Roots
Multiples and Factors
No Calculator Allowed

1.Highest Common Factor

Find the Highest Common Factor (HCF) for each pair of numbers.

1.   36 and 10   2.   50 and 30

3.   45 and 27   4.   100 and 36

5.   88 and 56   6.   36 and 32

2.Lowest Common Multiple

Find the Lowest Common Multiple (LCM) for each pair of numbers.

1.   6 and 9   2.   5 and 15

3.   12 and 8   4.   2 and 11

5.   12 and 8   6.   5 and 9

3.Prime Factors

Write each number as a product of its prime factors:

   1.   21   2. 12   3. 36   4. 50

4   Veena bought some food for a barbecue.
She is going to make some hot dogs.
She needs a bread roll and a sausage for each hot dog.

There are 40 bread rolls in a pack.
There are 24 sausages in a pack.

Veena bought exactly the same number of bread rolls and sausages.

(i) How many packs of bread rolls and packs of sausages did she buy?

(ii) How many hot dogs can she make?

U10 – Integers, Powers and Roots
Squares & Square Roots
No Calculator Allowed

1) Calculate the following,

a) $2^2 = 2 \times 2 = $ ___   b) $3^2 = 3 \times 3 = $ ___   c) $4^2 = $ __ $\times$ __ $= $ ___

d) $5^2 = $ __ $\times$ __ $= $ ___   e) $10^2 = $ __ $\times$ __ $= $ ___   f) $11^2 = $ __ $\times$ __ $= $___

2) Work out the following,

a) $\sqrt{100} = $ ___   b) $\sqrt{25} = $ ___   c) $\sqrt{16} = $ ___

d) $\sqrt{64} = $ ___   e) $\sqrt{1} = $ ___   f) $\sqrt{81} = $ ___

3a) Write down two square numbers between 10 and 30.   _____ _____

  b) I think of a number, its square root is 4. What is this number?   _____

4) Calculate the following,

  a) $2^2 + 3^2 = $ _____   b) $5^2 - 3^2 = $ _____

  c) $3^2 - 1^2 = $ _____   d) $-4^2 = $ _____

5) Doubling
The 25 squares shown below are arranged in 5 rows of 5. Suppose that 1 were to be placed on the first square, £2 on the next square, £4 on the next, £8 on the next, £16 on the next and so on.

£1	£2	£4	£8	£16
£32				

Assuming these amounts of money could be placed on the squares how much would be on,
   a) the last square? _____   b)   the whole board together?   _____

U10 – Integers, Powers and Roots
Squares, Cubes and Roots
Calculator Allowed for question 2 only

Section A

1) Sanjiv said 100 is a square number because 10 x 10 = 100
    Which of these numbers are also square numbers?

    143   121   231   169   123   144   245

2) Use the $\sqrt{}$ button on your calculator to find the square roots of these numbers.

    a) $\sqrt{289}$ b) $\sqrt{625}$ c) $\sqrt{529}$ d) $\sqrt{60.84}$ e) $\sqrt{15.6816}$ f) $\sqrt{0.5625}$

    _____   _____   _____   _____   _____   _____

Section B - Who am I?

1) I am a square number.

    The sum of my digits is 7 and the difference is 5.   _____

2) Squaring me is the same as doubling me.   _____

3) I am the closest odd square number to 100.   _____

Section C
Work out the following showing all working out.

1) 2^2 = _____   2) 4^2 = _____   3) 9^2 = _____

4) 6^2 = _____   5) 1^2 = _____   6) 5^2 = _____

7) $3^2 + 4^2$ = _____   8) $4^2 + 10^2$ = _____   9) $7^2 - 6^2$ = _____

10) $7^2 + 3^2 + 1^2$ = _____   11) $9^2 + 6^2$ = _____   13) 2^3 = _____

12) $10^2 + 7^2 - 8^2$ = _____   14) 1^3 = _____   15) 3^3 = _____

16) 4^3 = _____   17) 2^4 = _____   18) 1^{12} = _____

Find the values of:

(a) 4^3

(b) $\sqrt{64}$

(c) $\sqrt[3]{125}$

(d) $\sqrt{4} + \sqrt{9}$

(e) $\sqrt{16} \times \sqrt{25}$

U10 – Integers, Powers and Roots
Indices 1
No Calculator Allowed

1.

Find the values of:

(a) 4^3

(b) $\sqrt{64}$

(c) $\sqrt[3]{125}$

(d) $\sqrt{4} + \sqrt{9}$

(e) $\sqrt{16} \times \sqrt{25}$

2.

Simplify the following expressions, leaving your answer in index notation

a) $y^3 \times y^4 =$

b) $z^6 \times z^2 =$

c) $h^{-2} \times h^5 =$

d) $d^7 \div d^2 =$

e) $k^5 \div k =$

f) $v^3 \div v^{-2} =$

g) $(y^2)^3 =$

h) $(p^6)^{-2} =$

3.

Simplify the following expressions, leaving your answer in index notation

a) $(3y^3)^3 =$

b) $Z^0 =$

c) $6^{-2} =$

d) $(2d^7)^4 =$

U10 – Integers, Powers and Roots
Indices 2
No Calculator Allowed

Section A

1 Simplify:

a 3^0	b 6^0	c 10^0	d 8^0
e y^0	f a^0	g $2x^0$	h $(2x)^0$
i $\dfrac{x^3}{x^3}$	j $\dfrac{b^5}{b^5}$	k $3 + 2^0$	l $5 - 7^0$

2 Simplify, giving answers in simplest rational form:

a 4^{-1}	b 2^{-1}	c 6^{-1}	d 8^{-1}	e 2^{-2}
f 3^{-2}	g 7^{-2}	h 9^{-2}	i 3^{-3}	j 10^{-5}

Section B

Write as powers of 2, 3 or 5:

a 8	b $\frac{1}{8}$	c 9	d $\frac{1}{9}$
e 125	f $\frac{1}{125}$	g 32	h $\frac{1}{32}$
i 81	j $\frac{1}{81}$	k $\frac{1}{25}$	l 1

Section C

1. Simplify the following:

(a) $9^{\frac{1}{2}}$

(b) $27^{\frac{1}{3}}$

(c) $16^{\frac{1}{2}}$

(d) $16^{-\frac{1}{2}}$

(e) $27^{-\frac{2}{3}}$

2.

Rewrite the following in index form:

(a) $\sqrt{8}$

(b) $\sqrt[3]{m}$

(c) $(m^6)^{\frac{1}{2}}$

(d) $(10^{\frac{1}{2}})^3$

(e) $(16^{\frac{1}{2}})^{-2}$

U10 – Integers, Powers and Roots
Ordering Negatives and Negative Calculations
No Calculator Allowed

Section A

Put these numbers in order of size, smallest first.

    1)   6, 3, -2, 0, -4   ____ , ____ , ____ , ____ , ____

    2)   -4, 5, 2, -1, -9   ____ , ____ , ____ , ____ , ____

    3)   -23, 19, 30, -31, -1   ____ , ____ , ____ , ____ , ____

    4)   43, -102, -45, 63   ____ , ____ , ____ , ____

    5)   20, -32, -6, 34   ____ , ____ , ____ , ____

    6)   0.6, -9.3, -6, 7.2   ____ , ____ , ____ , ____

Section B

Complete the sequences.

    a)   5, 0, -5, -10, ___, ___, ___

    b)   -10, -8, -6, -4, ___, ___, ___

    c)   -7, -5, -3, -1, ___, ___, ___

Section C

1) $4 - 2 =$ ___   2) $5 - 6 =$ ___   3) $3 - 5 =$ ___   4) $2 - 4 =$ ___

5) $0 - 5 =$ ___   6) $-1 - 3 =$ ___   7) $-3 - 2 =$ ___   8) $-2 - 6 =$ ___

9) $-7 - 5 =$ ___   10) $-4 + 8 =$ ___   11) $-8 + 10 =$ ___   12) $-3 + 1 =$ ___

U10 – Integers, Powers and Roots
Negative Numbers
No Calculator Allowed

Multiplying and Dividing	Adding and Subtracting
	(Remember the first number is where you are starting on the number line the second number tells you which way to go!)

Multiplying and Dividing

4 x 5 =

8 x 2 =

28 ÷ 4 =

4 x 10 =

48 ÷ 12 =

-5 x 3 =

-4 x 6 =

-50 ÷ 10 =

-2 x 15 =

-60 ÷ 5 =

4 x -12 =

8 x -6 =

65 ÷ -5 =

30 x -2 =

60 ÷ -6 =

-6 x -5 =

-3 x -10 =

-32 ÷ -4 =

-4 x -12 =

-60 ÷ -12 =

Adding and Subtracting

(Remember the first number is where you are starting on the number line the second number tells you which way to go!)

14 + 5 =

-2 + 8 =

-12 + 4 =

4 + 10 =

-10 + 6 =

12 - 8 =

4 - 7 =

-6 - 5 =

5 - 12 =

-10 - 4 =

15 + -3 =

4 + -6 =

-11 + -10 =

-20 + -5 =

6 + -5 =

16 - -5 =

-3 - -1 =

-5 - -10 =

4 - -6 =

-5 - -14 =

U10 – Integers, Powers and Roots
Surds 1
No Calculator Allowed

Simplify fully:

1. (a) $\sqrt{2} \times \sqrt{2}$
    (b) $(\sqrt{5})^2$
    (c) $\sqrt{3} \times \sqrt{2}$
    (d) $6\sqrt{3} + 2\sqrt{3}$
    (e) $2(3 - \sqrt{7})$
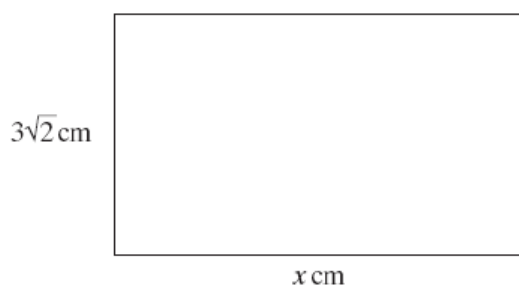   (f) $(2 + \sqrt{2}) - (3 + 2\sqrt{2})$
    (g) $3\sqrt{3} - 2(\sqrt{3} + 2)$

2. Expand and simplify the following expressions:

    (a) $\sqrt{2}(3 + \sqrt{5})$

    (b) $\sqrt{6}(\sqrt{2} + \sqrt{8})$

    (c) $4(\sqrt{5} + 3)$

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

    (e) $(3 - \sqrt{5})(3 - 2\sqrt{5})$

    (f) $(5 - \sqrt{2})(5 + \sqrt{2})$

    (g) $(2 + \sqrt{5})(2 + \sqrt{3})$

    (h) $(1 - \sqrt{2})(1 + \sqrt{3})$

    (i) $(8 - \sqrt{2})(8 + \sqrt{2})$

    (j) $(\sqrt{3} + \sqrt{5})(\sqrt{3} + \sqrt{5})$

3. Simplify the following surds:

    (a) $\sqrt{12}$ (b) $\sqrt{125}$ (c) $\sqrt{48}$ (d) $\sqrt{72}$ (e) $\sqrt{27}$

4.

The area of this rectangle is $30\,\text{cm}^2$.

$3\sqrt{2}\,\text{cm}$

$x\,\text{cm}$

Find the value of x, writing your answer in the form $a\sqrt{b}$ where a and b are integers.

U10 – Integers, Powers and Roots
Surds 2
No Calculator Allowed

1.

Rationalise the denominator of the following.

$$\frac{1}{\sqrt{7}}$$

$$\frac{2}{5\sqrt{3}}$$

$$\frac{1 + \sqrt{3}}{\sqrt{2}}$$

$$\frac{6\sqrt{7}}{5\sqrt{2}}$$

$$\frac{\sqrt{5} + 2\sqrt{2}}{\sqrt{5}}$$

$$\frac{4\sqrt{3} - 2\sqrt{2}}{7\sqrt{5}}$$

2.

Work out the value of the shaded area in the diagram below. All measurements are in centimetres.