30/03/2020

Number Higher

Name: _____

Maths Watch Reference

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## HCF and LCM

Things to remember:
- A factor is a whole number that divides exactly into another number.
- A multiple is a number that may be divided by another a certain number of times without a remainder.
- A prime number only has 2 factors – 1 and itself.
- HCF is an abbreviation of Highest Common Factor and LCM of Lowest Common Multiple.

Questions:

1. Tom and Amy set the alarms on their phones to sound at 6.45 am.
Both alarms sound together at 6.45 am.
Tom's alarm then sounds every 9 minutes.
Amy's alarm then sounds every 12 minutes.
At what time will both alarms next sound together?

....

(Total for question = 3 marks)

2. Caroline is making some table decorations.
Each decoration is made from a candle and a holder.
Caroline buys some candles and some holders each in packs.
There are 30 candles in a pack of candles.
There are 18 holders in a pack of holders.
Caroline buys exactly the same number of candles and holders.
(i) How many packs of candles and how many packs of holders does Caroline buy?
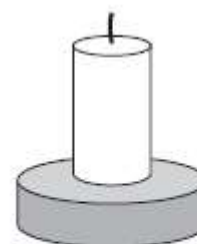
candle and
holder

.... packs of candles

.... packs of holders

Caroline uses all her candles and all her holders.
(ii) How many table decorations does Caroline make?

.... table decorations

(Total for question = 5 marks)

3. Buses to Acton leave a bus station every 24 minutes.
Buses to Barton leave the same bus station every 20 minutes.
A bus to Acton and a bus to Barton both leave the bus station at 9 00 am.
When will a bus to Acton and a bus to Barton next leave the bus station at the same time?

....

(Total for Question is 3 marks)

4. Rita is going to make some cheeseburgers for a party.
She buys some packets of cheese slices and some boxes of burgers.
There are 20 cheese slices in each packet.
There are 12 burgers in each box.
Rita buys exactly the same number of cheese slices and burgers.
(i)   How many packets of cheese slices and how many boxes of burgers does she buy?

.... packets of cheese slices

.... boxes of burgers

Rita wants to put one cheese slice and one burger into each bread roll.
She wants to use all the cheese slices and all the burgers.

(ii) How many bread rolls does Rita need?

.... bread rolls

(Total for Question is 4 marks)

5.   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?

.... packs of bread rolls

.... packs of sausages.

(ii) How many hot dogs can she make?

....
(Total for Question is 5 marks)

6.   Find the highest common factor (HCF) of 32, 48 and 72

....
(Total for question = 2 marks)

7.   Write 504 as a product of powers of its prime factors.

....
(Total for question = 3 marks)

8.   John buys some boxes of pencils and some packets of pens for people to use at a
conference.
There are 40 pencils in a box.
There are 15 pens in a packet.
John gives one pencil and one pen to each person at the conference.
He has no pencils left.
He has no pens left.
How many boxes of pencils and how many packets of pens did John buy?

.... boxes of pencils

.... packets of pens
(Total for question = 3 marks)

Laws of Indices 1

Things to remember:
- The exam question will use the word "simplify"
- When multiplying, add the indices
- When dividing, subtract the indices
- With brackets, multiply the indices
- If the exam question has the words "work out the value of", or "evaluate" it means the answer is a number.
- Anything to the power zero is 1
- Anything to the power one is itself
- Anything to a negative power becomes a reciprocal

Questions:

1. (a) Write down the reciprocal of 5

....
(1)

(b) Evaluate 3^{-2}

....
(1)
(Total for Question is 2 marks)

2. (a) Write down the value of $\sqrt{81}$

....
(1)

(b) Work out the value of $5^2 + 2^3$

....
(2)
(Total for Question is 3 marks)

3. Write these numbers in order of size. Start with the smallest number.

5^{-1} 0.5   -5 5^0

....
(Total for Question is 2 marks)

4. (a) Solve $3x^2 = 147$

....
(2)

(b) Work out the value of 2^{-3}

....
(1)

(c) Simplify $(3x^2)^3$

....
(2)
(Total for question = 5 marks)

5. (a) Simplify $a^4 \times a^5$

....
(1)

(b) Simplify $\dfrac{45e^6 f^8}{5ef^2}$

....
(2)

(c) Write down the value of $9^{\frac{1}{2}}$

....
(1)
(Total for Question is 4 marks)

6. (a) Simplify $5^4 \times 5^6$

....
(1)

(b) Simplify $7^5 \div 7^2$

....
(1)
(Total for Question is 2 marks)

7. Write down the value of
(i) 7^0

....

(ii) 5^{-1}

....

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

....
(Total for Question is 3 marks)

8. (a) Work out 3^4

....
(1)

(b) Write down the cube root of 64

....
(1)
(Total for Question is 2 marks)

Laws of Indices 2

Things to remember:

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

$$(a^m)^n = a^{mn}$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

Questions:

1. (a) Simplify $m^5 \div m^3$

....
(1)

   (b) Simplify $5x^4y^3 \times x^2y$

....
(2)
(Total for Question is 3 marks)

2. Write these numbers in order of size.
   Start with the smallest number.

   5^{-1} 0.5 -5 5^0

....
(Total for Question is 2 marks)

3. Write down the value of $125^{\frac{2}{3}}$

....
(Total for question is 1 mark)

4. (a) Write down the value of 10^{-1}

....
(1)

   (b) Find the value of $27^{\frac{2}{3}}$

....
(2)
(Total for Question is 3 marks)

8

5. (a) Find the value of $\quad 5^0$

....
(1)

(b) Find the value of $\quad 27^{1/3}$

....
(1)

(c) Find the value of $\quad 2^{-3}$

....
(1)
(Total for Question is 3 marks)

6. (a) Write down the value of $\quad 27^{1/3}$

....
(1)

(b) Find the value of $\quad 27^{-1/3}$

....
(2)
(Total for Question is 3 marks)

7. (a) Write down the value of $64^{\frac{1}{2}}$

....
(1)

(b) Find the value of $\left(\dfrac{8}{125}\right)^{-\frac{2}{3}}$

....
(2)
(Total for question = 3 marks)

8. (a) Write down the value of 6^0

....
(1)

(b) Work out $64^{-\frac{2}{3}}$

....
(2)
(Total for question = 3 marks)

Standard Form

Things to remember:
- $a \times 10^b$

$$1 \leq a < 10$$

1. A floppy disk can store 1 440 000 bytes of data.
   (a) Write the number 1 440 000 in standard form.

   ....
   (1)

   A hard disk can store 2.4×10^9 bytes of data.
   (b) Calculate the number of floppy disks needed to store the 2.4×10^9 bytes of data.

   ....
   (3)
   (Total 4 marks)

2. A nanosecond is 0.000 000 001 second.
   (a) Write the number 0.000 000 001 in standard form.

   ....
   (1)

   A computer does a calculation in 5 nanoseconds.
   (b) How many of these calculations can the computer do in 1 second?
   Give your answer in standard form.

   ....
   (2)
   (Total 3 marks)

3. (a) (i) Write 40 000 000 in standard form.

   ....

   (ii) Write 3×10^{-5} as an ordinary number.

   ....
   (2)

   (b) Work out the value of
   $3 \times 10^{-5} \times 40\ 000\ 000$
   Give your answer in standard form.

   ....
   (2)
   (Total 4 marks)

4. Work out $(3.2 \times 10^5) \times (4.5 \times 10^4)$
Give your answer in standard form correct to 2 significant figures.

....
(Total 2 marks)

5. (a) Write the number 40 000 000 in standard form.

....
(1)

(b) Write 1.4×10^{-5} as an ordinary number.

....
(1)

(c) Work out
$(5 \times 10^4) \times (6 \times 10^9)$
Give your answer in standard form.

....
(2)
(Total 4 marks)

6. Write in standard form
(a) 456 000

....
(1)

(b) 0.00034

....
(1)

(c) 16×10^7

....
(1)
(Total 3 marks)

7. (a) Write 5.7×10^{-4} as an ordinary number.

....
(1)

(b) Work out the value of $(7 \times 10^4) \times (3 \times 10^5)$
Give your answer in standard form.

....
(2)
(Total 3 marks)

8. (a) Write 30 000 000 in standard form.

....
(1)

(b) Write 2×10^{-3} as an ordinary number.

....
(1)
(Total 2 marks)

9. (a) (i) Write 7900 in standard form.

....

(ii) Write 0. 00035 in standard form.

....
(2)

(b) Work out $\frac{4 \times 10^3}{8 \times 10^{-5}}$

Give your answer in standard form.

....
(2)
(Total 4 marks)

10. Work out

$$\frac{2 \times 2.2 \times 10^{12} \times 1.5 \times 10^{12}}{2.2 \times 10^{12} - 1.5 \times 10^{12}}$$

Give your answer in standard form correct to 3 significant figures.

....
(Total 3 marks)

11. (a) Write 6.4×10^4 as an ordinary number.

....
(1)

(b) Write 0.0039 in standard form.

....
(1)

(c) Write 0.25×10^7 in standard form.

....
(1)
(Total 3 marks)

Estimating Calculations

Things to remember:
- Round each number to one significant figure first (e.g. nearest whole number, nearest ten, nearest one decimal place) – this earns you one mark.
- Don't forget to use the correct order of operations.

Questions:

1. Work out an estimate for $\dfrac{3.1 \times 9.87}{0.509}$

....
(Total for Question is 3 marks)

2. Margaret has some goats.
The goats produce an average total of 21.7 litres of milk per day for 280 days.
Margaret sells the milk in ½ litre bottles.
Work out an estimate for the total number of bottles that Margaret will be able to fill with the milk.
You must show clearly how you got your estimate.

....
(Total for Question is 3 marks)

3. Work out an estimate for the value of $\dfrac{89.3 \times 0.51}{4.8}$

....
(Total for Question is 2 marks)

4. Work out an estimate for $\sqrt{1.98 + 2.16 \times 7.35}$

....
(Total for question = 3 marks)

5. A ticket for a seat at a school play costs £2.95
There are 21 rows of seats.
There are 39 seats in each row.
The school will sell all the tickets.
Work out an estimate for the total money the school will get.

£ ....
(Total for Question is 3 marks)

6. Jayne writes down the following

3.4 × 5.3 = 180.2

Without doing the exact calculation, explain why Jayne's answer cannot be correct.

…...

…...

…...
(Total for question is 1 mark)