Types of Number and BODMAS

1 Use your calculator to work out $\dfrac{197.8}{\sqrt{0.01 + 0.23}}$ (GRADE 4)

Give your answer to 2 decimal places.

.....

[Total 2 marks]

2 Use your calculator to work out $\sqrt{\dfrac{12.71 + 137.936}{\cos 50° \times 13.2^2}}$ (GRADE 4)

Give your answer to 2 decimal places.

.....

[Total 2 marks]

3 x and y are integers and $0 < x < y$.
Write down two sets of values for x and y such that $6 = \sqrt{3x + 2y}$. (GRADE 5)

$x =$ ..... , $y =$ .....

or $x =$ ..... , $y =$ .....

[Total 2 marks]

4 Circle the irrational numbers from the list below. (GRADE 5)

5.5 π 2.5^2 $\sqrt{3}$ 0.6π $\sqrt{16}$ $\frac{7}{9}$

[Total 2 marks]

Score: ☐ / **8**

Multiples, Factors and Prime Factors

1 Express: 

a) 210 as a product of its prime factors.

.....

[2]

b) 105^2 as a product of its prime factors.

.....

[2]

[Total 4 marks]

2 Eric says "even square numbers always have more factors than odd square numbers". Find examples to show that Eric is wrong. 

.....

[Total 2 marks]

3 A number, x, is a common multiple of 6 and 7, and a common factor of 252 and 420. Given that $50 < x < 150$, find the value of x. 

$x =$ .....

[Total 4 marks]

Score: ____ / **10**

LCM and HCF

1 $P = 3^7 \times 11^2$ and $Q = 3^4 \times 7^3 \times 11$. (GRADE 4)

Write as the product of prime factors:

a) the LCM of P and Q,

.....

[1]

b) the HCF of P and Q.

.....

[1]

[Total 2 marks]

2 $X = 2^8$, $Y = 2^5 \times 5^3$ and $Z = 2^6 \times 5^2 \times 7$. (GRADE 5)

Write as the product of prime factors:

a) the LCM of X, Y and Z,

.....

[2]

b) the HCF of X, Y and Z.

.....

[2]

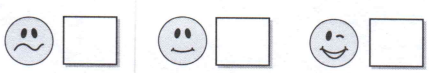
[Total 4 marks]

3 A and B are different prime numbers. Find the LCM of A and B. (GRADE 6)

.....

[Total 2 marks]

Score: ____ / **8**



Fractions

1 Which of these fractions is closest to 1? (GRADE 3)

$\frac{5}{6}$ $\frac{3}{4}$ $\frac{7}{8}$ $\frac{4}{5}$

.....

[Total 1 mark]

2 Work out: (GRADE 4)

Make sure each fraction has the same denominator.

a) $3\frac{1}{2} + 2\frac{3}{5}$

.....

[3]

b) $3\frac{3}{4} - 2\frac{1}{3}$

.....

[3]

[Total 6 marks]

3 Francis owns all the shares of his company.
He sells $\frac{2}{15}$ of the shares to Spencer and $\frac{5}{12}$ of the shares to Jamie. (GRADE 4)

What fraction of the shares does Francis still own? Give your answer in its simplest form.

.....

[Total 3 marks]

4 Look at shapes X, Y and Z below. (GRADE 4)

X Y Z

$\frac{2}{5}$ of shape X is shaded and $\frac{6}{7}$ of shape Y is shaded.
What fraction of shape Z is shaded?

.....

[Total 3 marks]

5 If $a = \frac{3}{4}$ and $b = 2\frac{1}{2}$, find the value of $\frac{1}{a} + \frac{1}{b}$. (GRADE 4)

.....

[Total 3 marks]

6 Work out the following, giving your answers as mixed numbers. (GRADE 4)

a) $1\frac{2}{3} \times \frac{9}{10}$

.....

[3]

b) $3\frac{1}{2} \div 1\frac{2}{5}$

.....

[3]

[Total 6 marks]

7 A factory buys 25 tonnes of flour. $17\frac{1}{2}$ tonnes of the flour is used to make scones. $\frac{1}{5}$ of the scones are cheese scones. (GRADE 4)

a) What fraction of the total amount of flour is used to make cheese scones?

.....

[2]

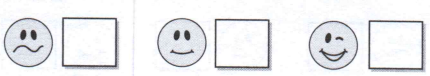
b) What percentage of the total amount of flour is used to make cheese scones?

..... %

[1]

[Total 3 marks]

Score: ☐/25



Fractions and Recurring Decimals

1 Write $\frac{10}{11}$ as a recurring decimal. (GRADE 4)

.....

[Total 1 mark]

2 Write $\frac{7}{33}$ as a recurring decimal. (GRADE 6)

.....

[Total 2 marks]

3 Write each of the following in the form $\frac{a}{b}$. Simplify your answers as far as possible. (GRADE 6)

a) $0.\dot{7}$ Let $r = 0.\dot{7}$

Start by naming the decimal.

so, $10r =$ .....

$10r - r =$ ..... $- 0.\dot{7}$

$9r =$ .....

$r =$ .....

.....

[2]

b) $0.\dot{2}\dot{6}$

.....

[2]

c) $1.\dot{3}\dot{6}$

.....

[3]

[Total 7 marks]

4 Show that $0.59\dot{0}\dot{0} = \frac{13}{22}$ (GRADE 7)

Hint: start by trying to get only the non-repeating part before the decimal point.

[Total 3 marks]

Score: ☐ / **13**

Rounding Numbers and Estimating

1 Look at the following calculation: $\dfrac{215.7 \times 44.8}{460}$ GRADE 4

a) By rounding each number to 1 significant figure, give an estimate for $\dfrac{215.7 \times 44.8}{460}$.

.....

[3]

b) Will your answer to part a) be larger or smaller than the exact answer? Explain why.

.....

.....

[2]

[Total 5 marks]

2 Work out an estimate for $\sqrt{\dfrac{2321}{19.673 \times 3.81}}$ GRADE 4

Show all of your working.

.....

[Total 3 marks]

3 A cone has a radius (r) of 10 cm, a vertical height (h) of 24 cm and a slant height (l) of 26 cm. Find an estimate for: GRADE 4

a) The volume of the cone.

You will need the formulas:
volume = $\frac{1}{3}\pi r^2 h$ and
surface area = $\pi rl + \pi r^2$.

..... cm^3

[2]

b) The surface area of the cone.

..... cm^2

[2]

[Total 4 marks]

Score: ☐ / **12**

Bounds

1 The width of a rectangular piece of paper is 23.6 centimetres, correct to 1 decimal place.
The length of the paper is 54.1 centimetres, correct to 1 decimal place.

a) Write down the lower bound for the length of the paper. (GRADE 5)

..... cm

[1]

b) Calculate the lower bound for the perimeter of the piece of paper. (GRADE 6)

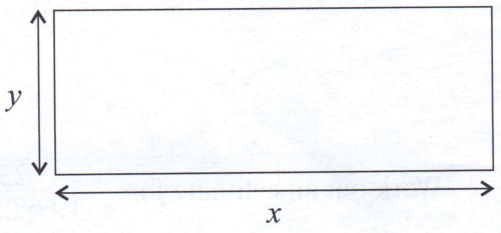
..... cm

[2]

[Total 3 marks]

2 Here is a rectangle.
$x = 55$ mm to the nearest 5 mm.
$y = 30$ mm to the nearest 5 mm. (GRADE 7)

Not to scale



Calculate the upper bound for the area of this rectangle.
Give your answer to 3 significant figures.

..... mm^2

[Total 3 marks]

3 Given that $x = 2.2$ correct to 1 decimal place, find the interval that contains the value of $4x + 3$. Give your answer as an inequality. (GRADE 7)

.....

[Total 4 marks]

4 Samantha is comparing the volume of two buckets. She measures the volume of each bucket to the nearest 0.1 litres and finds that bucket A has a volume of 8.3 litres and bucket B has a volume of 13.7 litres. (GRADE 7)

Calculate the lower bound of the difference, in litres, between the volumes of bucket A and bucket B

..... litres

[Total 2 marks]

5 Rounded to 1 decimal place, a triangle has a height of 3.2 cm and an area of 5.2 cm^2.
Calculate the upper bound for the base length of the triangle, giving your answer to 2 d.p. GRADE 7

..... cm

[Total 3 marks]

6 Dan runs 100 m, measured to the nearest metre. His time is 12.5 s to the nearest tenth of a second. GRADE 7

Use the formula below to find Dan's speed to a suitable number of significant figures.
Give a reason for your final answer.

$$\text{speed (m/s)} = \frac{\text{distance (m)}}{\text{time (s)}}$$

lower bound for distance = ... m
upper bound for time = ... s

lower bound for speed = $\frac{\text{..... m}}{\text{..... s}}$ = ... m/s

to 2 s.f. = ... m/s to 1 s.f. = ... m/s

upper bound for distance = ... m
lower bound for time = ... s

upper bound for speed = $\frac{\text{..... m}}{\text{..... s}}$ = ... m/s

to 2 s.f. = ... m/s to 1 s.f. = ... m/s

TIP: compare your upper and lower bounds.

.....

.....

[Total 5 marks]

7 A cuboid measures 0.94 m by 0.61 m by 0.21 m, each measured to the nearest cm. GRADE 7

Find the volume of the cuboid in m^3 to a suitable degree of accuracy.

..... m^3

[Total 4 marks]

Exam Practice Tip

If you're stuck in the exam wondering which bounds to use in a calculation, think about what would happen if you used the upper or lower bound for each of the numbers in your calculation. And remember that dividing something by a bigger number gives you a smaller number — and vice versa.

Score ____ / **24**

Standard Form

1 $A = 4.834 \times 10^9$, $B = 2.7 \times 10^5$, $C = 5.8 \times 10^3$ GRADE 4

a) Express A as an ordinary number.

.....

[1]

b) Work out $B \times C$. Give your answer in standard form.

.....

[2]

c) Put A, B and C in order from smallest to largest.

....., ..., ...

[1]

[Total 4 marks]

2 Light travels at approximately 1.86×10^5 miles per second.
The distance from the Earth to the Sun is approximately 9.3×10^7 miles. GRADE 5

How long will it take light to travel this distance?
Give your answer in standard form.

..... seconds

[Total 2 marks]

3 $A = (5 \times 10^5) + (5 \times 10^3) + (5 \times 10^2) + (5 \times 10^{-2})$ GRADE 6

Find the value of A. Give your answer as an ordinary number

.....

[Total 2 marks]

4 The distance from Neptune to the Sun is approximately 4.5×10^9 km.
The distance from the Earth to the Sun is approximately 1.5×10^8 km. GRADE 6

Calculate the ratio of the Earth-Sun distance to the Neptune-Sun distance.
Give your answer in the form $1 : n$.

.....

[Total 3 marks]

5 A patient has been prescribed a dose of 4×10^{-4} grams of a certain drug to be given daily. GRADE 6

a) The tablets that the hospital stocks each contain 8×10^{-5} grams of the drug.
How many tablets should the patient be given each day?

..... tablets
[3]

b) The doctor increases the patient's daily dose of the drug by 6×10^{-5} grams.
What is the patient's new daily dose of the drug?

TIP: you need matching powers to be able to add two numbers together in standard form.

..... grams per day
[3]

[Total 6 marks]

6 A cruise ship weighs approximately 7.59×10^7 kg.
Its passengers weigh a total of 2.1×10^5 kg. GRADE 6

Express the weight of the passengers as a percentage of the total combined weight of the ship and passengers. Give your answer to 2 decimal places.

..... %
[Total 3 marks]

7 Express $\dfrac{3^2}{2^{122} \times 5^{120}}$ in standard form. GRADE 7

$$\frac{3^2}{2^{122} \times 5^{120}} = \frac{\ldots\ldots}{2^{\ldots\ldots}(2^{\ldots\ldots} \times 5^{120})}$$

$$= \frac{\ldots\ldots}{\ldots\ldots \times 10^{\ldots\ldots}}$$

$$= \frac{\ldots\ldots}{\ldots\ldots} \times \frac{1}{10^{\ldots\ldots}}$$

$$= \ldots\ldots \times 10^{\ldots\ldots}$$

.....
[Total 2 marks]

Score: ☐/22