Year 8 mathematics test

Paper 1
Calculator not allowed

Please read this page, but do not open your booklet until your teacher tells you to start. Write your details in the spaces below.

First name ____________________________
Last name _____________________________
Class ________________________________
Date _________________________________

Remember
- The test is 1 hour long.
- You must not use a calculator for any question in this test.
- You will need: pen, pencil, rubber, ruler, a pair of compasses and tracing paper (optional).
- Some formulae you might need are on page 2.
- This test starts with easier questions.
- Try to answer all the questions.
- Write all your answers and working on the test paper – do not use any rough paper. Marks may be awarded for working.
- Check your work carefully.
- Ask your teacher if you are not sure what to do.

For marking use only

Total marks ____________________________
Instructions

Answers
This means write down your answer or show your working and write down your answer.

Calculators
You must not use a calculator to answer any question in this test.

Formulae
You might need to use these formulae.

Trapezium
Area = \( \frac{1}{2} (a + b)h \)

Prism
Volume = area of cross-section \( \times \) length
1. Look at these number cards.

-7  -5  -3  -1  1  3  5  7

(a) Choose any two of the number cards that add to 2

\[ \boxed{\phantom{-}1} + \boxed{\phantom{-}1} = 2 \]

1 mark

(b) Choose any three of the number cards that add to -5

\[ \boxed{\phantom{-}1} + \boxed{\phantom{-}1} + \boxed{\phantom{-}1} = -5 \]

1 mark

(c) Choose any four of the number cards that add to 0

\[ \boxed{\phantom{-}1} + \boxed{\phantom{-}1} + \boxed{\phantom{-}1} + \boxed{\phantom{-}1} = 0 \]

1 mark
2 Dave and Steve are in a high jump competition.

Dave jumps $1 \frac{1}{4}$ metres.
Steve jumps 1.4 metres.

Who jumps higher? Tick ($\checkmark$) Dave or Steve.

[ ] Dave  [ ] Steve

How much higher does he jump?
Give your answer in metres.

[ ] metres

2 marks
Fill in the gaps to show what the units measure.
The first one is done for you.

- **centimetres** measure \( \textit{length} \)
- **kilograms** measure 
- **litres** measure 
- **square metres** measure 

\[ 3 \text{ marks} \]

When \( n \) is 5, work out the value of \( 2(n + 1) \)

\[ 1 \text{ mark} \]
(a) Here are three numbers.

\[
\begin{align*}
4 & \\
8 & \\
9 & 
\end{align*}
\]

Show that the mean of these three numbers is 7

(b) The mean of three numbers is 5

One of these numbers is 2

What could the other numbers be?
Write them on the cards below.

\[
\begin{align*}
2 & \\
& \\
& 
\end{align*}
\]

What else could the numbers be?
Use different numbers from your answer above.
Write them on the cards below.

\[
\begin{align*}
2 & \\
& \\
& 
\end{align*}
\]
(a) Use a ruler and compasses to draw a triangle that has these side lengths:

\[
5\text{cm, } 5\text{cm, } 8\text{cm}
\]

(b) Sally says it is possible to draw a triangle with these side lengths:

\[
5\text{cm, } 5\text{cm, } 12\text{cm}
\]

Is she correct? Tick (✓) Yes or No.

\[
\begin{align*}
\square & \text{ Yes} \\
\square & \text{ No}
\end{align*}
\]

Explain how you know.
7 A petrol station shows this information:

10 litres = 2.2 gallons

How many gallons is 50 litres?

………………. gallons

2 marks
The diagram shows four identical white rectangles around a shaded square.

What is the area of the shaded square?
I think of a number.

4% of my number is 42

(a) What is 40% of my number?

(b) What is my number?
(a) Write the missing decimal so that each pair adds to 1

The first one is done for you.

\[
\begin{array}{c}
\text{fraction} \quad \text{decimal} \\
\frac{1}{4} + \quad \Box \\ = 1 \\
\frac{3}{10} + \quad \Box \\ = 1 \\
\frac{3}{5} + \quad \Box \\ = 1 \\
\end{array}
\]

(b) Write the missing fraction so that the pair below adds to 1

Write the fraction as simply as possible.

\[
\begin{array}{c}
\text{fraction} \quad \text{decimal} \\
\Box + 0.72 \\ = 1 \\
\end{array}
\]
Here is a sequence of patterns made from hexagons and triangles.

(a) In pattern number 90, how many hexagons and how many triangles will there be?

(b) In which pattern will there be 100 triangles?
12. The diagram shows a kite drawn on a square grid.

Draw five more of these kites to show how they tessellate.
Expressions

Use the expressions on cards P, Q, R, S and T to answer the questions below.

\[
\begin{align*}
\text{card P:} & \quad 3a + 1 \\
\text{card Q:} & \quad 2(a - 1) \\
\text{card R:} & \quad a^2 - 2 \\
\text{card S:} & \quad (a + 1)^2 \\
\text{card T:} & \quad 6 - a
\end{align*}
\]

(a) When \(a = 3\), which card has the highest value?

\[3(3) + 1 = 10\]

(b) When \(a = -3\), which card has the highest value?

\[2(-3 - 1) = -8\]

(c) Which card’s value is **never negative** whatever the value of \(a\)?

\[(a + 1)^2 \geq 0\] for all \(a\).
14 Look at the information in the box.

\[
\frac{16}{80} = 20\%
\]

The information can help you work out other number facts.

Fill in the missing numbers below.

\[
\frac{32}{160} = \underline{\phantom{0}}\% \quad \text{"1 mark"}
\]

\[
\frac{16}{40} = \underline{\phantom{0}}\% \quad \text{"1 mark"}
\]

\[
\frac{80}{\underline{\phantom{0}}} = 60\% \quad \text{"1 mark"}
\]
The graph shows square ABCD.

The equation of the straight line through C and D is $x = 7$

(a) What is the equation of the straight line through B and C?

\[ \text{ } \]

(b) What is the equation of the straight line through B and D?

\[ \text{ } \]
The pupils in a class recorded the length of time they took to do their maths homework.

The stem-and-leaf diagram shows the results, in minutes.

There are 25 pupils in the class.

(a) The shortest time was 18 minutes.

What was the longest time?

(b) What length of time was the mode?

(c) What length of time was the median?
Fill in the missing powers.
The first one is done for you.

\[ 8 \times 7 \times 7 = 8 \times 7 \]

\[ 6.3 \times 15^2 \times 15^3 = 6.3 \times 15^5 \]

\[ \frac{3 \times 12^6}{12^2} = 3 \times 12^4 \]
A triangle has three sides that are \(13\text{ cm}, y + 8\text{ cm}\) and \(3y + 1\text{ cm}\) long.

The triangle is isosceles.

What could the lengths of the sides be?

There are three different answers.

Write all three answers.

First answer: \(\ldots\ldots\text{ cm, cm, cm}\)

Second answer: \(\ldots\ldots\text{ cm, cm, cm}\)

Third answer: \(\ldots\ldots\text{ cm, cm, cm}\)

3 marks
19 (a) The height of a cuboid is 4 cm.

The volume of the cuboid is \(100\text{cm}^3\)

What is the area of the shaded face?

\[\text{cm}^2\]

(b) The volume of another cuboid is \(100\text{cm}^3\)

None of its dimensions is 4 cm.

What could the dimensions of this cuboid be?

\[\text{cm by cm by cm}\]

(c) A prism has a cross-section that is a right-angled triangle.

Its volume is \(100\text{cm}^3\)

What could the dimensions of this prism be?

\[\text{cm by cm by cm}\]
A teacher tells her pupils:

Think of a whole number between 1 and 10

Multiply your number by 9, then

add the digits together, then

subtract 5

Use the code $A = 1$, $B = 2$, etc. to change your answer to a letter.

Think of a country beginning with your letter.

The teacher tells the pupils that they are thinking of Denmark and they are amazed.

Give a mathematical reason to show why this trick works.

2 marks
Asha uses a graphic calculator to draw the graph of $y = x + 1$

Then she enters the equation of another line. This new line is parallel to the line $y = x + 1$

(a) Which equation below is the equation of the new line? Put a ring round the correct answer.

- $y = 3x + 1$
- $y = x + 3$
- $3y = x + 1$
- $y = 3x + 3$

(b) Then Asha enters the equation of a different line. This line is parallel to the x-axis.

What is the equation of this line?
Two travel agents offer a week in Spain for the same original price.

Jane and Rosa both book early for this holiday.

Jane pays £16 more than Rosa.

What was the original price of the holiday?

£
I have two fair dice, each numbered 1 to 6
I am going to throw the two dice.

What is the probability that the sum of the numbers on the dice will be a square number?
24 (a) Look at this inequality.

\[ y + 2 < 3 \]

Which values of \( y \) below make the inequality true?
Tick (✓) all correct values.

-2 -1 0 1 2

'1 mark'

(b) Now look at this inequality.

\[ y + 2 < 3y \]

Which values of \( y \) below make the inequality true?
Tick (✓) all correct values.

-2 -1 0 1 2

'1 mark'

(c) James says:

'I can think of a value of \( y \) that makes both inequalities true'.

Show that James is wrong.