

Percentages

Exam questions

Foundation and Higher tiers

Please write clearly in block capitals.

Name

Class Teacher

Time allowed: 210 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 11): you must not use a calculator.
- **Section B** (questions 12 to 56): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 188.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher's use

Q	Mark	Q	Mark	Q	Mark
1		20		39	
2		21		40	
3		22		41	
4		23		42	
5		24		43	
6		25		44	
7		26		45	
8		27		46	
9		28		47	
10		29		48	
11		30		49	
12		31		50	
13		32		51	
14		33		52	
15		34		53	
16		35		54	
17		36		55	
18		37		56	
19		38			
TOTAL					

Section A**You must not use a calculator**Do not
write
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the box

- 1** Shade 40% of this grid.

[1 mark]

- 2** (a) Write 0.6 as a percentage.

Answer _____

[1 mark]

- (b) Write 35% as a fraction in its simplest form.

Answer _____

[1 mark]

- 3** Work out 15% of 360

Answer _____

[2 marks]

- 4** Write these in order of size. Start with the smallest.

$$0.42 \quad \frac{2}{5} \quad 41\% \quad \frac{9}{20}$$

Answer _____

[2 marks]

- 5** A choir has 80 members.
28 of them sing alto.

What percentage of the choir sing alto?

Answer _____ %

[2 marks]

- 6** Two outdoor shops sell the same tent.

Shop A	Shop B
£68 25% off	£75 $\frac{1}{3}$ off

In which shop is the tent cheaper?
You must show your working.

Answer _____

[3 marks]

- 7 Work out the missing number.
 30% of $80 = \dots\dots\%$ of 60

Answer _____

[2 marks]

- 8 Rhys says,
"If a price goes up by 20% and then down by 20% , it ends up back where it started."
- Is Rhys correct?
You must show your working.

[2 marks]

- 9 In a school, 45% of the students are boys. The rest are girls.
 30% of the boys walk to school.
 40% of the girls walk to school.

What percentage of all the students walk to school?

Answer _____ %

[3 marks]

- 10** A water butt is 45% full.
It now contains 72 litres of water.

How many more litres of water are needed to fill it?

Answer _____ litres

[3 marks]

- 11** The length of a rectangle is increased by 20%
The width of the rectangle is decreased by 15%

Work out the percentage change in the area of the rectangle.

Answer _____

[3 marks]

Section B

You may use a calculator

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the box

- 12** A garden centre took £6284 on Saturday.
23% of this money was from selling plants.

How much money was from selling plants?

Answer £ _____

[2 marks]

- 13** A gym membership costs £36.50 a month.
The price goes up by 8%

Work out the new price.

Answer £ _____

[2 marks]

- 14** A community garden is raising money for a new greenhouse.
The target is £3850
So far, £2918.40 has been raised.

- (a) What percentage of the target has been raised so far?
Give your answer to 1 decimal place.

Answer _____ %

[2 marks]

- (b) A local business donates 15% of the target.
Will the garden now reach its target?
You must show your working.

[2 marks]

- 15** A van was bought for £18 400
It was sold two years later for £13 800

Work out the percentage decrease in its value.

Answer _____ %

[3 marks]

- 16** An online first aid course ends with a quiz of 65 questions.
To pass, you must get at least 78% of the questions right.

- (a) Ravi gets 49 questions right.
Does he pass the quiz?
You must show your working.

[2 marks]

- (b) What is the least number of questions you must get right to pass?

Answer _____

[2 marks]

- 17** The table shows the price of a weekly bus ticket on three routes in 2024 and in 2025.

	2024	2025
Route 12	£14.80	£16.20
Route 36	£8.60	£9.50
Route 51	£22.40	£24.10

Which route had the greatest percentage increase in price?
You must show your working.

Answer _____

[3 marks]

- 18** Priya puts £2750 into a savings account.
The account pays 1.85% **simple** interest each year.

(a) Work out the total interest she earns in 4 years.

Answer £ _____

[2 marks]

(b) After how many whole years will the amount in her account first be more than £3000?

Answer _____ years

[2 marks]

- 19** A refill pouch holds 1.5 litres of hand soap.
Eli uses 340 ml of the soap to fill some dispensers.

What percentage of the soap is left in the pouch?
Give your answer to 1 decimal place.

Answer _____ %

[3 marks]

- 20** The population of a town is 48 316
17.4% of the people in the town are under 16 years old.

How many people in the town are 16 or over?

Answer _____

[3 marks]

- 21** The fuel tank of Ola's car holds 55 litres when it is full.
The fuel gauge shows the tank is 35% full.
Fuel costs 148.9p per litre.

Ola has £50.
Does she have enough money to fill the tank?
You must show your working.

[4 marks]

22

A market trader buys 40 candles for £118 altogether.
She sells 36 of the candles for £4.25 each.
The other candles are damaged, so she cannot sell them.

Work out her percentage profit.
Give your answer to 1 decimal place.

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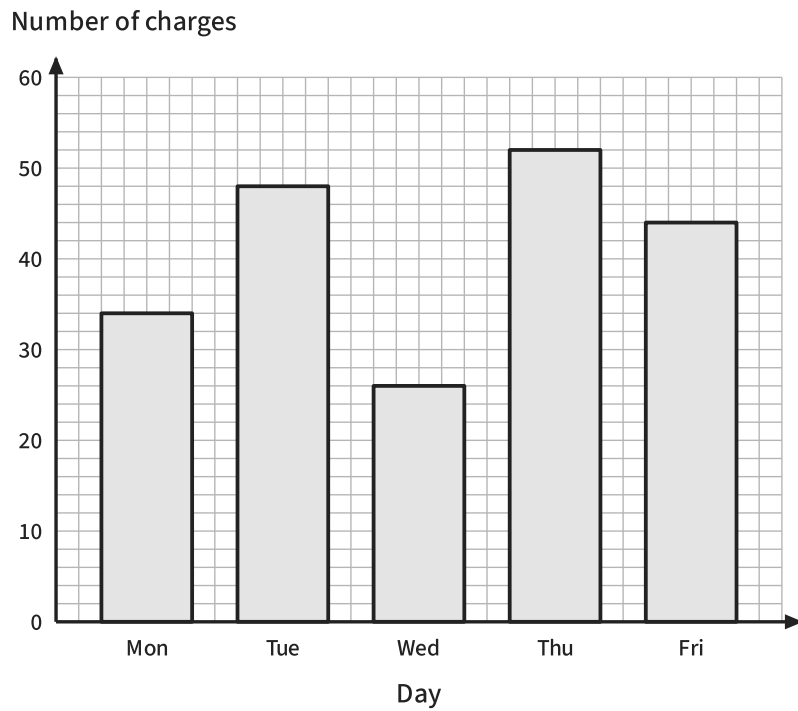
Answer _____ %

[3 marks]

23

The bar chart shows the number of times an electric car charger was used on each day from Monday to Friday of one week.

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What percentage of these charges were on Thursday?

Give your answer to 1 decimal place.

Answer _____ %

[3 marks]

- 24** Zara's phone shows that she used it for 5 hours 42 minutes on Saturday.
38% of this time was spent watching videos.

How long did Zara spend watching videos?

Give your answer in hours and minutes, to the nearest minute.

Answer _____

[3 marks]

- 25** Ana earns £11.86 an hour. She gets a pay rise of 4.8%
Ben earns £12.20 an hour. He gets a pay rise of 2.1%

Who earns more per hour after the pay rises?

You must show your working.

Answer _____

[3 marks]

- 26** In a sale, all prices are reduced by 15%
A jacket costs £57.80 in the sale.

Work out the price of the jacket before the sale.

Answer £ _____

[3 marks]

- 27** Amir invests £4200 in a savings account.
The account pays 2.5% compound interest each year.
- Work out the value of his savings after 3 years.

Answer £ _____

[3 marks]

- 28** Kofi wants a new phone for the next 24 months.

Option A	Option B
Buy the phone for £649 with a 15% student discount and pay £8.50 a month for a SIM	Pay £32.40 a month for a contract that includes the phone

Which option is cheaper over 24 months, and by how much?
You must show your working.

Answer _____

[4 marks]

- 29** A bike helmet costs £83.94
This price includes VAT at 20%
- How much of the price is VAT?

Answer £ _____

[3 marks]

- 30** A new car costs £14 750
Its value falls by 18% in the first year.
After that, its value falls by 11% each year.
- Work out the value of the car after 3 years.

Answer £ _____

[3 marks]

- 31** A shop sells porridge oats in two packs.

Pack A	Pack B
750 g for £3.15	600 g with 30% extra free for £3.29

Which pack is better value for money?
You must show your working.

Answer _____

[4 marks]

- 32** Owen borrows £3650 to buy a kiln for his pottery.
He pays **simple** interest on the loan.
After 4 years he has paid £394.20 in interest.

Work out the yearly rate of interest.

Answer _____ %

[3 marks]

33

A ranger counts the red squirrels in a forest.

In 2021 there were 1840 red squirrels.

In 2024 there were 2213 red squirrels.

- (a) Work out the percentage increase from 2021 to 2024.
Give your answer to 1 decimal place.

Answer _____ %

[2 marks]

- (b) The ranger expects the number to increase by the same percentage from 2024 to 2027.
Estimate the number of red squirrels in 2027.

Answer _____

[2 marks]

34

There are 2400 bats in a colony.

The number of bats increases by 6% each year.

After how many whole years will there first be more than 3000 bats?

Answer _____ years

[3 marks]

35

Ella has £6000 to invest for 5 years.

Account A	Account B
3% compound interest each year	3.2% simple interest each year

Which account gives more interest after 5 years, and by how much?
You must show your working.

Answer _____

[4 marks]

36

Hana has £8000 to invest for 6 years. She looks at two accounts.

Account X	Account Y
2.4% compound interest every year	4% interest in the first year, then 1.9% compound interest each year after that

Which account will give Hana more money after 6 years, and by how much?
You must show your working.

Answer _____

[4 marks]

37

A shop buys lamps from a supplier.

The shop sells each lamp for 35% more than it paid.

In a sale, the shop reduces its price by 10%

The sale price of a lamp is £63.18

- (a) How much did the shop pay the supplier for a lamp?

Answer £ _____

[3 marks]

- (b) What percentage profit does the shop make on a lamp sold in the sale?

Answer _____ %

[1 mark]

38

The table shows the value of an investment at the end of each of its first three years.

Year	0 (start)	1	2	3
Value	£5000	£5160	£5325.12	£5495.52

- (a) Show that the value goes up by the same percentage each year.

[2 marks]

- (b) The value keeps going up by this percentage each year.
Work out the value at the end of year 8.

Answer £ _____

[2 marks]

- 39** In a library, 38% of the books are fiction. The rest are non-fiction.
15% of the fiction books are crime novels.
There are 4104 crime novels.

How many non-fiction books are in the library?

Answer _____

[4 marks]

- 40** Jonah puts £5000 into an account that pays 3.1% compound interest each year.
At the end of year 2, after the interest is added, he takes out £1200

How much is in the account at the end of year 4?

Answer £ _____

[4 marks]

- 41** At the start of a dry spell, a reservoir holds 280 million litres of water.
Each week, the amount of water in the reservoir falls by 4.5% of the amount at the start of that week.

How much water does the reservoir lose altogether in the first 6 weeks?
Give your answer to 3 significant figures.

Answer _____ million litres
[3 marks]

- 42** A café buys a coffee machine. Its value falls by 12% each year.
After 2 years it is worth £13 939.20

Work out how much the café paid for the coffee machine.

Answer £ _____
[3 marks]

- 43** The value of Rosa's shares went up by 12% in 2023.
Their value went down by 20% in 2024.
Their value went up by 8% in 2025.

- (a)** Work out the overall percentage change in the value of the shares from the start of 2023 to the end of 2025.

Answer _____

[2 marks]

- (b)** By what percentage must the value go up in 2026 to get back to its value at the start of 2023?
Give your answer to 1 decimal place.

Answer _____ %

[2 marks]

- 44** In one country, income tax is worked out like this.

Earnings each year	Tax
the first £12 000	no tax
from £12 000 to £45 000	20%
over £45 000	40%

Kai paid £9873.60 income tax last year.

How much did Kai earn last year?

Answer £ _____

[5 marks]

- 45** Mei invested some money for 4 years at 2.8% compound interest each year. She earned £613.16 in interest altogether.

How much money did Mei invest?

Answer £ _____

[3 marks]

- 46** The value of a house was £236 000 at the start of 2023.
In 2023 its value went up by 3.5%
In 2024 and in 2025 its value went up by $x\%$ each year.
At the end of 2025 the house was worth £260 395

Work out the value of x .

Give your answer to 2 decimal places.

Answer _____

[4 marks]

- 47** A food truck sells wraps and smoothies.
The price of a wrap goes up by 8%
The price of a smoothie goes down by 12%
The total price of one wrap and one smoothie is £11.25 both before and after the changes.
Work out the price of a wrap before the changes.

Answer £ _____

[4 marks]

- 48** Two narrowboats were each bought for £64 000
The value of narrowboat A falls by 15% every 2 years.
The value of narrowboat B falls by 7.5% every year.

- (a) Kim says,
“The two narrowboats lose value at the same rate, because 15% every 2 years is the same as 7.5% every year.”
Show that Kim is wrong.

[2 marks]

- (b) The value of narrowboat A falls by the same percentage each year.
Work out this percentage.
Give your answer to 1 decimal place.

Answer _____ %

[2 marks]

- 49** A company makes tins in the shape of a cylinder.
It makes a new tin with a radius 8% greater than the old tin.
The new tin has the same volume as the old tin.

Work out the percentage decrease in the height of the tin.
Give your answer to 1 decimal place.

Answer _____ %

[4 marks]

50

Dev borrows £2000

At the end of each month, interest of 1.5% is added to the amount he owes.

Then Dev pays back £250, or the whole amount he owes if that is less than £250

Amounts are rounded to the nearest penny each month.

- (a) How much does Dev owe after his payment at the end of month 2?

Answer £ _____

[2 marks]

- (b) How many payments does Dev make altogether, and how much is his last payment?

Answer _____

[3 marks]

- 51** The number of bees, N , in a hive t weeks after the start of spring is modelled by

$$N = a \times b^t$$
 where a and b are constants.
 When $t = 2$, $N = 6615$
 When $t = 5$, $N = 7658$

(a) Work out the values of a and b .

Answer _____

[4 marks]

(b) What does the value of b tell you about the number of bees?

[1 mark]

- 52** A balloon is in the shape of a sphere.
 More air is blown into the balloon, and it stays in the shape of a sphere.
 The surface area of the balloon increases by 30%

 Work out the percentage increase in the volume of the balloon.
 Give your answer to 1 decimal place.

Answer _____ %

[3 marks]

53

The price of a games console went up by $x\%$
Later, the new price went down by $2x\%$
Overall, the price went down by 10.4%

Work out the value of x .

Give your answer to 1 decimal place.

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Answer _____

[4 marks]

54

A patient takes a 400 mg dose of a medicine at 8 am every day.
By 8 am the next day, 38% of the medicine that was in the body has left it.
There is none of the medicine in the body before the first dose.

- (a) Work out the amount of medicine in the body just after the third dose.

Answer _____ mg
[2 marks]

- (b) The amount just after each dose gets closer and closer to a fixed value.
Work out this value, to the nearest milligram.

Answer _____ mg
[2 marks]

- (c) Just after which dose is the amount in the body first more than 1000 mg?

Answer _____
[2 marks]

- 55** A podcast had 12 000 subscribers.
The number of subscribers increased by $r\%$ each year for 4 years.
Then the number decreased by $r\%$ each year for the next 4 years.
At the end of the 8 years there were 11 520 subscribers.

Work out the value of r .

Give your answer to 1 decimal place.

Answer _____

[4 marks]

- 56** Mo wants to invest some money for 5 years. He compares two accounts.

Account P	Account Q
3.8% compound interest each year no fee	4.6% compound interest each year a fee of £150 is taken from the money when the account is opened

Work out the least whole number of pounds Mo could invest so that Account Q gives him more money than Account P after 5 years.

Answer £ _____

[4 marks]

END OF QUESTIONS