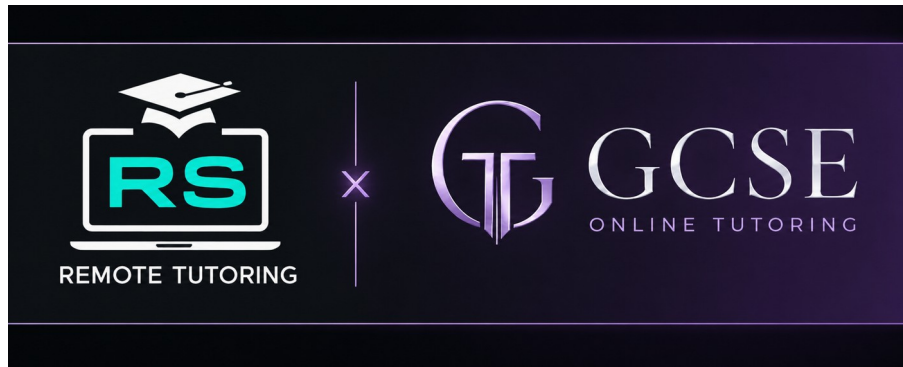




GCSE MATHEMATICS

FOUNDATION TIER

RATIO, PROPORTION AND RATES

PRACTICE BOOK

Modules 9-12 | 180 original questions | Formula guides, full answers and marking guidance

FREE WEBSITE EDITION

Student name: _____

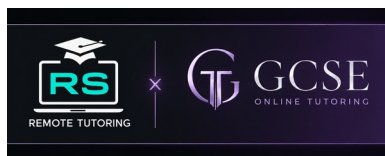
Target grade: _____ Start date: _____ Completion date: _____

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Unit 2 Contents and Study Plan

MODULES 9-12 • FREE WEBSITE EDITION

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

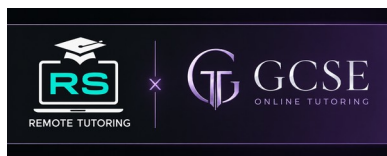
Complete Core Skills first, then Exam Practice and Grade 4-5 Challenge. Finish each module with same-topic retrieval. Formula guides and all answers are collected at the end of the book.

Module	Topic	Specification	Score
9	Ratio Notation, Simplifying and Sharing	R3, R4, R5, R6	____ / ____
10	Scale, Recipes and Proportion	R2, R7, R8, R10	____ / ____
11	Rates and Compound Measures	R1, R11	____ / ____
12	Percentage Change, Growth and Decay	R9, R16	____ / ____

Book structure

- 15 Core Skills questions per module
- 15 original exam-style questions per module
- 10 Grade 4-5 challenge questions per module
- 5 same-topic retrieval questions per module
- Formula and method bank for every module
- All answers and concise marking methods at the end

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Unit 2 Specification Coverage Map

INDEPENDENTLY AUTHORED PRACTICE MAP

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____

Date: _____

Score: _____ / _____

Every question is independently authored. This page identifies the GCSE Mathematics skills covered by the unit. It is not a reproduction or adaptation of an AQA question paper, mark scheme, examiner report or other assessment material.

Module	Specification alignment	Design guidance
Module 9	R3-R6	simplify/share; ratio↔fraction; mixtures; linked and changing ratios
Module 10	R2, R7, R8, R10	maps/scales; recipes; unitary method; direct and inverse proportion
Module 11	R1, R11	unit conversion; speed and other rates; density/pressure; compound-unit problems
Module 12	R9, R16	percentage change; reverse percentage; simple/compound interest; growth/decay

Specification references above identify curriculum coverage only. All questions, diagrams, solutions and marking guidance in this resource are independently authored.



Ratio Notation, Simplifying and Sharing

CORE SKILLS • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Build accuracy and fluency. Complete every question.

1. Write the ratio 12 red counters to 18 blue counters in its simplest form. [1 mark]

2. Simplify the ratio 35:49. [1 mark]

3. Simplify 1.2:0.8. [2 marks]

4. Simplify 250 g : 1 kg. [2 marks]

5. A bag contains 8 green and 20 yellow beads. Write green:yellow in simplest form. [1 mark]

6. The ratio of adults to children is 3:7. There are 21 adults. Find the number of children. [2 marks]

7. The ratio of boys to girls is 5:4. There are 36 pupils altogether. Find the number of girls. [2 marks]

8. Share £45 in the ratio 2:3. [2 marks]



Ratio Notation, Simplifying and Sharing

CORE SKILLS • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Continue the core set. Check methods, units and exact values.

9. Share 84 sweets in the ratio 3:4. [2 marks]

10. A length is divided in the ratio 5:2. The shorter part is 14 cm. Find the longer part. [2 marks]

11. Orange and apple juice are mixed in the ratio 2:5. Find the amount of apple juice needed for 300 ml of orange juice. [2 marks]

12. Write the ratio 3:5 as the fraction of the total that is the first part. [1 mark]

13. In a class, the ratio of left-handed to right-handed pupils is 1:9. What fraction are left-handed? [1 mark]

14. Write the ratio $\frac{2}{5} : \frac{3}{10}$ as a ratio of whole numbers in simplest form. [2 marks]

15. Red, blue and white paint are mixed in the ratio 2:3:5. There are 40 litres altogether. Find each amount. [3 marks]



Ratio Notation, Simplifying and Sharing

EXAM PRACTICE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Original exam-style questions. Show each stage of your method.

1. The ratio of cats to dogs at a rescue centre is 7:5. There are 60 animals. How many are cats? [3 marks]

2. A recipe uses flour, sugar and butter in the ratio 5:2:3. Mia uses 450 g of flour. Find the mass of butter. [3 marks]

3. A prize of £960 is shared between Ali and Beth in the ratio 5:3. Find the difference between their shares. [4 marks]

4. A drink is made with squash and water in the ratio 1:6. Sam makes 2.1 litres. Find the volume of squash. [3 marks]

5. The angles in a triangle are in the ratio 2:3:4. Find all three angles. [4 marks]



Ratio Notation, Simplifying and Sharing

EXAM PRACTICE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Continue the exam set. Explain decisions where requested.

6. Two numbers are in the ratio 4:7. Their sum is 99. Find the two numbers. [3 marks]

7. Two numbers are in the ratio 3:8. Their difference is 35. Find the two numbers. [4 marks]

8. A school has boys:girls = 6:7. There are 84 girls. After 12 boys leave, show that the new ratio is 5:7. [3 marks]

9. A bag contains red:blue:green counters in the ratio 4:5:3. There are 24 green counters. Find the total number of counters. [3 marks]

10. Paint A mixes red:white = 3:2. Paint B mixes red:white = 7:5. Which mixture has the greater fraction of red? [3 marks]



Ratio Notation, Simplifying and Sharing

EXAM PRACTICE • PART C

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the exam set. Check accuracy, units and presentation.

11. Shop A sells 6 notebooks for £8.10. Shop B sells 10 for £13.20. Which is better value? [4 marks]

12. A 750 g cereal box costs £3.15. A 1.2 kg box costs £4.80. Compare the cost per 100 g. [4 marks]

13. The ratio $x:y$ is $2:5$ and $y:z$ is $3:4$. Find $x:y:z$ in whole numbers. [4 marks]

14. The ratio $a:b$ is $4:9$. The ratio $b:c$ is $6:5$. Find $a:b:c$. [4 marks]

15. A jar contains £1 and 50p coins in the ratio $3:5$. There are 64 coins. Find their total value. [4 marks]



Ratio Notation, Simplifying and Sharing

GRADE 4-5 CHALLENGE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Multi-step reasoning. Plan before calculating.

1. A sum is shared between A, B and C in the ratio 2:3:7. C receives £210 more than A. Find the total sum. [4 marks]

2. The ratio of red to blue counters is 3:5. After 6 red counters are added, the ratio becomes 3:4. There were initially 40 blue counters. Find the initial number of red counters and check the new ratio. [4 marks]

3. A rectangle has length:width = 7:4 and perimeter 88 cm. Find its area. [5 marks]

4. A class has boys:girls = 5:7. Four boys join and two girls leave. The numbers then become equal. Find the original class size. [5 marks]

5. A drink contains juice and water in the ratio 2:7. After 300 ml of water is added, the ratio becomes 1:4. Find the original volume of the drink. [5 marks]



Ratio Notation, Simplifying and Sharing

GRADE 4-5 CHALLENGE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the challenge set. Present a clear mathematical argument.

6. A and B share money in the ratio 4:7. B gives £45 to A and they then have equal amounts. Find the original total. [5 marks]

7. The ratio of adults to children at an event is 3:8. After 18 adults arrive, the ratio is 3:5. There are 80 children. Find the original number of adults. [4 marks]

8. A bag contains red, blue and green beads. Red:blue=2:3 and blue:green=4:5. There are 75 green beads. Find the total number. [4 marks]

9. Two alloys contain copper:zinc in ratios 3:2 and 5:3. Which has the larger copper percentage, and by how many percentage points? [4 marks]

10. Red and blue counters are in the ratio 4:7. After 18 blue counters are removed, the ratio is 2:3. Find the original number of each colour. [5 marks]



Ratio Notation, Simplifying and Sharing

MIXED RETRIEVAL

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Same-topic retrieval practice. Work without notes where possible.

1. Simplify the ratio 54:72. [2 marks]

2. Share £132 in the ratio 5:6. [2 marks]

3. The ratio of red to blue counters is 3:7. What fraction of the counters are blue? [1 mark]

4. The ratio p:q is 4:9 and q:r is 3:5. Find p:q:r. [3 marks]

5. A drink uses juice:water = 2:5. There are 1.4 litres altogether. Find the amount of water. [2 marks]



Scale, Recipes and Proportion

CORE SKILLS • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Build accuracy and fluency. Complete every question.

1. y is directly proportional to x . When $x=2$, $y=8$. Find y when $x=5$. [2 marks]

2. y is directly proportional to x . When $x=3$, $y=18$. Find y when $x=7$. [2 marks]

3. y is directly proportional to x . When $x=4$, $y=20$. Find y when $x=9$. [2 marks]

4. y is directly proportional to x . When $x=5$, $y=15$. Find y when $x=8$. [2 marks]

5. y is directly proportional to x . When $x=7$, $y=14$. Find y when $x=11$. [2 marks]

6. A recipe for 4 people uses 240 g of flour. Find the flour needed for 10 people. [2 marks]

7. A recipe for 6 people uses 330 g of flour. Find the flour needed for 15 people. [2 marks]

8. A recipe for 5 people uses 275 g of flour. Find the flour needed for 12 people. [2 marks]



Scale, Recipes and Proportion

CORE SKILLS • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Continue the core set. Check methods, units and exact values.

9. On a map, 2 cm represents 5 km. Find the real distance represented by 7 cm. [2 marks]

10. On a map, 3 cm represents 12 km. Find the real distance represented by 8 cm. [2 marks]

11. On a map, 4 cm represents 18 km. Find the real distance represented by 11 cm. [2 marks]

12. A map scale is 1:50,000. A route measures 3.6 cm. Find the real distance in metres. [3 marks]

13. A map scale is 1:25,000. A route measures 8.4 cm. Find the real distance in metres. [3 marks]

14. Complete the proportion $6:15 = x:35$. [2 marks]

15. Eight identical machines make a batch in 6 hours. Assuming inverse proportion, find the time for 12 machines. [3 marks]



Scale, Recipes and Proportion

EXAM PRACTICE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Original exam-style questions. Show each stage of your method.

1. A recipe for 6 uses 420 g of rice. Work out the amount for 14 people. [3 marks]

2. A recipe for 8 uses 600 g of pasta. Work out the amount for 20 people. [3 marks]

3. A recipe for 5 uses 350 g of fruit. Work out the amount for 18 people. [3 marks]

4. A map has scale 1:40,000. A path is 6.5 cm long. Find its actual length in kilometres. [3 marks]

5. A map has scale 1:125,000. A path is 4.8 cm long. Find its actual length in kilometres. [3 marks]



Scale, Recipes and Proportion

EXAM PRACTICE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Continue the exam set. Explain decisions where requested.

6. A map has scale 1:20,000. A path is 9.2 cm long. Find its actual length in kilometres. [3 marks]

7. y is directly proportional to x . $y=30$ when $x=4$. Find y when $x=11$. [3 marks]

8. y is directly proportional to x . $y=42$ when $x=6$. Find y when $x=15$. [3 marks]

9. y is directly proportional to x . $y=52$ when $x=8$. Find y when $x=18$. [3 marks]

10. 5 workers take 12 hours at the same rate. How long would 8 workers take? [3 marks]



Scale, Recipes and Proportion

EXAM PRACTICE • PART C

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Complete the exam set. Check accuracy, units and presentation.

11. 6 workers take 15 hours at the same rate. How long would 10 workers take? [3 marks]

12. 4 workers take 21 hours at the same rate. How long would 7 workers take? [3 marks]

13. A photograph 8 cm wide is enlarged in the ratio 5:2. Find the new width. [2 marks]

14. A model car is 18 cm long at scale 1:24. Find the actual length in metres. [3 marks]

15. The cost C is directly proportional to mass m. 3.5 kg costs £8.40. Find the cost of 6 kg. [4 marks]



Scale, Recipes and Proportion

GRADE 4-5 CHALLENGE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Multi-step reasoning. Plan before calculating.

1. A recipe uses flour:sugar:butter = 5:2:3. A baker has 1.8 kg of butter. Find the maximum total mass of mixture. [4 marks]

2. A map scale is 1:50,000. A rectangular park is 4.2 cm by 3.6 cm on the map. Find its actual area in hectares. [5 marks]

3. y is directly proportional to x . When $x=12$, $y=7.5$. Find x when $y=18.75$. [4 marks]

4. p is inversely proportional to q . $p=18$ when $q=4$. Find p when $q=10$. [4 marks]

5. A journey takes 6 hours at 50 mph. Assuming time is inversely proportional to speed, find the time at 75 mph. [4 marks]



Scale, Recipes and Proportion

GRADE 4-5 CHALLENGE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the challenge set. Present a clear mathematical argument.

6. A plan uses scale 1:200. A room has actual area 48 m^2 and plan length 6 cm. Find its plan width. [5 marks]

7. Twelve pumps empty a tank in 35 minutes. After 10 minutes, 5 pumps stop. Find the total time, assuming equal rates. [5 marks]

8. A recipe for 8 uses 300 ml milk. Priya has 1.65 litres. What is the greatest number of complete portions she can make? [4 marks]

9. A scale drawing is enlarged by scale factor 1.5. Its area was 32 cm^2 . Find the new area. [4 marks]

10. Two quantities are directly proportional. Increasing x by 20% changes y from 45 to what value? [3 marks]



Scale, Recipes and Proportion

MIXED RETRIEVAL

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Same-topic retrieval practice. Work without notes where possible.

1. A recipe for 4 uses 180 g flour. Find the amount for 10. [2 marks]

2. Scale 1:25,000: find actual metres for 7.2 cm. [3 marks]

3. $y \propto x$ and $y=24$ when $x=6$. Find y at $x=9$. [2 marks]

4. 6 workers take 8 hours. Find time for 12 workers. [2 marks]

5. A model is scale 1:30 and is 14 cm long. Find actual metres. [2 marks]



Rates and Compound Measures

CORE SKILLS • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Build accuracy and fluency. Complete every question.

1. Travel 150 km in 3 hours. Find average speed. [2 marks]

2. Travel 84 km in 1.4 hours. Find average speed. [2 marks]

3. Travel 225 km in 4.5 hours. Find average speed. [2 marks]

4. Travel 96 km in 1.5 hours. Find average speed. [2 marks]

5. Travel 42 km in 0.7 hours. Find average speed. [2 marks]

6. A substance has mass 540 g and volume 60 cm³. Find density. [2 marks]

7. A substance has mass 1260 g and volume 140 cm³. Find density. [2 marks]

8. A substance has mass 875 g and volume 125 cm³. Find density. [2 marks]



Rates and Compound Measures

CORE SKILLS • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Continue the core set. Check methods, units and exact values.

9. A force of 480 N acts over 60 m². Find pressure. [2 marks]

10. A force of 735 N acts over 105 m². Find pressure. [2 marks]

11. A force of 960 N acts over 120 m². Find pressure. [2 marks]

12. Convert 72 km/h to m/s. [2 marks]

13. Convert 15 m/s to km/h. [2 marks]

14. A tap fills 18 litres in 2.5 minutes. Find litres per minute. [2 marks]

15. A pack of 750 g costs £3.60. Find cost per 100 g. [2 marks]



Rates and Compound Measures

EXAM PRACTICE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Original exam-style questions. Show each stage of your method.

1. A vehicle travels at 68 km/h for 2.75 hours. Find the distance. [3 marks]

2. A vehicle travels at 52 km/h for 3.5 hours. Find the distance. [3 marks]

3. A vehicle travels at 75 km/h for 1.8 hours. Find the distance. [3 marks]

4. A journey of 315 km is made at 70 km/h. Find the time. [3 marks]

5. A journey of 264 km is made at 48 km/h. Find the time. [3 marks]



Rates and Compound Measures

EXAM PRACTICE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Continue the exam set. Explain decisions where requested.

6. A journey of 187.5 km is made at 62.5 km/h. Find the time. [3 marks]

7. A metal block has density 7.8 g/cm^3 and volume 45 cm^3 . Find its mass. [3 marks]

8. A liquid has mass 1.26 kg and density 0.9 g/cm^3 . Find its volume in cm^3 . [4 marks]

9. A pressure of 2400 N/m^2 acts on area 0.35 m^2 . Find the force. [3 marks]

10. A force of 1500 N creates pressure 6000 N/m^2 . Find area. [3 marks]



Rates and Compound Measures

EXAM PRACTICE • PART C

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Complete the exam set. Check accuracy, units and presentation.

11. A 1.5 kg bag costs £4.35 and a 900 g bag costs £2.70. Which is better value per kg? [4 marks]

12. A pipe carries 480 litres in 16 minutes. How many litres in 1 hour at this rate? [3 marks]

13. A cyclist travels 18 km in 45 minutes. Find speed in km/h. [3 marks]

14. A car travels 120 km at 60 km/h then 180 km at 90 km/h. Find average speed. [5 marks]

15. A printer produces 840 pages in 12 minutes. Find pages per second. [3 marks]



Rates and Compound Measures

GRADE 4-5 CHALLENGE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Multi-step reasoning. Plan before calculating.

1. A runner covers 5 km at 12 km/h and 3 km at 9 km/h. Find average speed. [5 marks]

2. A solid cuboid 8 cm by 5 cm by 3 cm has mass 936 g. Find density. [4 marks]

3. A hollow object has outer volume 250 cm^3 , inner empty volume 70 cm^3 and mass 1.44 kg. Find material density. [5 marks]

4. A force of 18 kN acts on a rectangle 0.6 m by 0.25 m. Find pressure. [4 marks]

5. A car goes 150 km at 75 km/h and returns at 50 km/h. Find average speed for the whole journey. [5 marks]



Rates and Compound Measures

GRADE 4-5 CHALLENGE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the challenge set. Present a clear mathematical argument.

6. Fuel costs £1.52 per litre. A car travels 47 miles per gallon. Use 1 gallon=4.5 L. Find fuel cost for 235 miles. [5 marks]

7. A tank fills at 28 L/min but leaks at 3.5 L/min. It starts empty. How long to reach 980 L? [4 marks]

8. Two taps fill 6 L/min and 9 L/min. A drain empties 2 L/min. Find time for 520 L. [4 marks]

9. A block density is 2.7 g/cm^3 . Its mass is 5.4 kg. It has base 20 cm by 15 cm. Find height. [5 marks]

10. A machine produces 375 items in 2.5 h. After improvement its rate rises by 12%. Find items in 8 h. [4 marks]



Rates and Compound Measures

MIXED RETRIEVAL

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Same-topic retrieval practice. Work without notes where possible.

1. Find speed for 144 km in 2.4 h. [2 marks]

2. Find mass when density=4.5 g/cm³ and volume=80 cm³. [2 marks]

3. Find pressure for 900 N over 30 m². [2 marks]

4. Convert 25 m/s to km/h. [2 marks]

5. A 2 kg pack costs £5.40. Find cost per 100 g. [2 marks]



Percentage Change, Growth and Decay

CORE SKILLS • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Build accuracy and fluency. Complete every question.

1. Increase £240.00 by 15%. [2 marks]

2. Increase £360.00 by 8%. [2 marks]

3. Increase £1250.00 by 12%. [2 marks]

4. Increase £84.00 by 25%. [2 marks]

5. Increase £560.00 by 35%. [2 marks]

6. Decrease £180.00 by 20%. [2 marks]

7. Decrease £450.00 by 12%. [2 marks]

8. Decrease £96.00 by 15%. [2 marks]



Percentage Change, Growth and Decay

CORE SKILLS • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Continue the core set. Check methods, units and exact values.

9. Decrease £720.00 by 5%. [2 marks]

10. Decrease £250.00 by 32%. [2 marks]

11. A price rises from £80 to £92. Find the percentage increase. [2 marks]

12. A population falls from 640 to 560. Find percentage decrease. [2 marks]

13. After a 20% discount, a coat costs £56. Find original price. [3 marks]

14. After a 15% increase, a bill is £138. Find original amount. [3 marks]

15. Find simple interest on £900 at 4% per year for 3 years. [3 marks]



Percentage Change, Growth and Decay

EXAM PRACTICE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Original exam-style questions. Show each stage of your method.

1. £500.00 is invested at 4% compound interest for 3 years. Find the final amount. [4 marks]

2. £1200.00 is invested at 3% compound interest for 5 years. Find the final amount. [4 marks]

3. £850.00 is invested at 6% compound interest for 2 years. Find the final amount. [4 marks]

4. £2000.00 is invested at 2.5% compound interest for 4 years. Find the final amount. [4 marks]

5. A value of £24000.00 depreciates by 12% each year for 3 years. Find its value. [4 marks]



Percentage Change, Growth and Decay

EXAM PRACTICE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Continue the exam set. Explain decisions where requested.

6. A value of £1800.00 depreciates by 18% each year for 2 years. Find its value. [4 marks]

7. A value of £650.00 depreciates by 9% each year for 4 years. Find its value. [4 marks]

8. A shop increases £160 by 25% then discounts the result by 20%. Find the final price. [4 marks]

9. A salary of £28,000 rises by 3.5%. Find the increase and new salary. [3 marks]

10. A £72 item has VAT of 20% added. Find total. [2 marks]



Percentage Change, Growth and Decay

EXAM PRACTICE • PART C

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the exam set. Check accuracy, units and presentation.

11. A sale price after 30% off is £91. Find original. [3 marks]

12. A town grows from 48,000 to 52,320. Find percentage growth. [3 marks]

13. An amount gains 5% then 8%. Find the overall percentage increase. [4 marks]

14. An item loses 10% then 15%. Find overall percentage decrease. [4 marks]

15. Simple interest makes £150 on £750 over 5 years. Find annual rate. [4 marks]



Percentage Change, Growth and Decay

GRADE 4-5 CHALLENGE • PART A

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Multi-step reasoning. Plan before calculating.

1. A value increases by 20% then decreases by 20%. Explain the net change. [3 marks]

2. After two annual increases of 5%, an investment is £2205. Find the starting amount. [4 marks]

3. A car is worth £14,580 after two years of 10% depreciation. Find its original value. [4 marks]

4. A population grows 3% yearly from 80,000. Find first year it exceeds 90,000. [5 marks]

5. An account pays 4% compound interest. How much must be invested to have £5000 after 6 years? [5 marks]



Percentage Change, Growth and Decay

GRADE 4-5 CHALLENGE • PART B

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Complete the challenge set. Present a clear mathematical argument.

6. A shop marks up cost by 40% then gives 15% discount. Cost is £75. Find profit percentage. [5 marks]

7. A machine loses 18% value yearly. After 3 years it is worth £13,778.08. Find original. [5 marks]

8. A number is increased by $p\%$ using multiplier 1.32. Find p . [2 marks]

9. Two offers: 25% off £240, or £55 off £240. Which is cheaper and by how much? [4 marks]

10. A bank offers 3.8% compound or 4% simple for 5 years on £3000. Which gives more? [5 marks]



Percentage Change, Growth and Decay

MIXED RETRIEVAL

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Same-topic retrieval practice. Work without notes where possible.

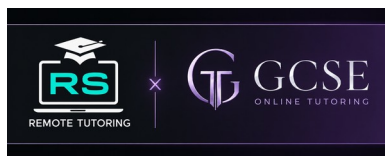
1. Increase £320 by 12%. [2 marks]

2. Decrease £450 by 18%. [2 marks]

3. A price goes 200 to 230. Find percentage increase. [2 marks]

4. After 25% off, price is £90. Find original. [3 marks]

5. £1000 grows 5% for 2 years. [3 marks]



Ratio Notation, Simplifying and Sharing

FORMULAS AND METHOD BANK

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use these methods before checking the answer tables. Write the setup first, substitute values, calculate, then give a final answer with units.

When to use it	Formula / method
Simplify a ratio	Put both quantities in the same units. Divide every part by their highest common factor (HCF).
Scale a ratio	Find the multiplier: known amount $\div$ matching ratio part. Multiply every other part by the same multiplier.
Share a total in a ratio	1. Add the ratio parts. 2. One part = total $\div$ total parts. 3. Each share = one part $\times$ its ratio part.
First part as a fraction	first fraction = first ratio part $\div$ total ratio parts. For a:b, first fraction = $a/(a+b)$.
Difference given	Difference in ratio parts = larger part $-$ smaller part. One part = stated difference $\div$ difference in parts.
Three-part ratio	For a:b:c, total parts = $a+b+c$. One part = total $\div$ ($a+b+c$).
Combine two ratios	Make the shared quantity equal using a common multiple, then join the remaining parts. Example 2:5 and 3:4 $\rightarrow$ 6:15:20.
Compare mixtures	Convert the chosen part to a fraction of the total, then compare fractions, decimals or percentages.
Best value	unit cost = total cost $\div$ number of items, mass or volume. The lower unit cost is better value.
Changing-ratio problem	Let the original amounts be ratio part $\times$ k. Form an equation after the stated change, solve for k, then check the new ratio.
Fraction or percentage to ratio	Convert every part to the same form, then remove fractions/decimals and simplify. Example 35%:65% = 35:65 = 7:13.
Ratio with different item values	Find the number in each ratio part first. Multiply each number by its item value, then add or compare the resulting values.

Marking reminder: a correct setup can earn method marks even when a later arithmetic error occurs.



Scale, Recipes and Proportion

FORMULAS AND METHOD BANK

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use these methods before checking the answer tables. Write the setup first, substitute values, calculate, then give a final answer with units.

When to use it	Formula / method
Direct proportion	$y=kx$; $k=y/x$.
Inverse proportion	$y=k/x$; $k=xy$.
Recipe scaling	new amount = original amount $\times$ new servings $\div$ original servings.
Scale 1:n	actual length = drawing length $\times$ n, in the same units.
Unitary method	Find one unit by division, then multiply by the required number of units.
Inverse work	workers $\times$ time = constant, when all workers have equal rates.
Length enlargement	new length = original length $\times$ scale factor.
Area enlargement	new area = original area $\times$ scale factor ² .
Volume enlargement	new volume = original volume $\times$ scale factor ³ .

Marking reminder: a correct setup can earn method marks even when a later arithmetic error occurs.



Rates and Compound Measures

FORMULAS AND METHOD BANK

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use these methods before checking the answer tables. Write the setup first, substitute values, calculate, then give a final answer with units.

When to use it	Formula / method
Speed	$\text{speed} = \text{distance} \div \text{time}.$
Distance	$\text{distance} = \text{speed} \times \text{time}.$
Time	$\text{time} = \text{distance} \div \text{speed}.$
Density	$\text{density} = \text{mass} \div \text{volume}.$
Mass	$\text{mass} = \text{density} \times \text{volume}.$
Volume	$\text{volume} = \text{mass} \div \text{density}.$
Pressure	$\text{pressure} = \text{force} \div \text{area}.$
Force	$\text{force} = \text{pressure} \times \text{area}.$
Area from pressure	$\text{area} = \text{force} \div \text{pressure}.$
Rate	$\text{rate} = \text{quantity} \div \text{time}.$
Conversions	$\text{km/h} \div 3.6 = \text{m/s}; \text{m/s} \times 3.6 = \text{km/h}.$
Average speed	total distance $\div$ total time; do not average two speeds directly.

Marking reminder: a correct setup can earn method marks even when a later arithmetic error occurs.



Percentage Change, Growth and Decay

FORMULAS AND METHOD BANK

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use these methods before checking the answer tables. Write the setup first, substitute values, calculate, then give a final answer with units.

When to use it	Formula / method
Percentage change	$\text{change} \div \text{original} \times 100\%$.
Increase multiplier	$1 + \text{percentage}/100$.
Decrease multiplier	$1 - \text{percentage}/100$.
Reverse percentage	$\text{original} = \text{final} \div \text{multiplier}$.
Simple interest	$\text{interest} = \text{principal} \times \text{annual rate} \times \text{time}$.
Compound growth	$\text{final} = \text{original} \times \text{growth multiplier}^{\text{number of periods}}$.
Repeated depreciation	$\text{final} = \text{original} \times \text{decay multiplier}^{\text{number of periods}}$.
Overall repeated change	multiply the successive multipliers; convert the final multiplier back to a percentage.
Find time	test integer powers or solve by systematic trial at Foundation level.

Marking reminder: a correct setup can earn method marks even when a later arithmetic error occurs.



Ratio Notation, Simplifying and Sharing

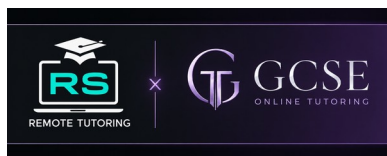
CORE SKILLS • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	12:18; divide both parts by 6 $\rightarrow$ 2:3.	1	B1: correct result or statement.
2	HCF(35,49)=7; 35:49 = 5:7.	1	B1: correct result or statement.
3	Multiply both parts by 10: 12:8; divide by 4 $\rightarrow$ 3:2.	2	M1 method; A1 answer.
4	Convert 1 kg=1000 g. 250:1000 = 1:4.	2	M1 method; A1 answer.
5	8:20; divide by 4 $\rightarrow$ 2:5.	1	B1: correct result or statement.
6	Scale factor $21 \div 3 = 7$; children $= 7 \times 7 = 49$.	2	M1 method; A1 answer.
7	Total parts=9; one part $= 36 \div 9 = 4$; girls $= 4 \times 4 = 16$.	2	M1 method; A1 answer.
8	Total parts=5; $\pounds 45 \div 5 = \pounds 9$; shares $\pounds 18$ and $\pounds 27$.	2	M1 method; A1 answer.



Ratio Notation, Simplifying and Sharing

CORE SKILLS • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	Total parts=7; $84 \div 7 = 12$; shares 36 and 48.	2	M1 method; A1 answer.
10	One part= $14 \div 2 = 7$ cm; longer= $5 \times 7 = 35$ cm.	2	M1 method; A1 answer.
11	Scale factor= $300 \div 2 = 150$; apple= $5 \times 150 = 750$ ml.	2	M1 method; A1 answer.
12	Total parts=8; first fraction= $3/8$.	1	B1: correct result or statement.
13	Total parts=10; fraction= $1/10$.	1	B1: correct result or statement.
14	Multiply both parts by 10: 4:3.	2	M1 method; A1 answer.
15	Total parts=10; one part=4 L; red=8 L, blue=12 L, white=20 L.	3	M1 setup; M1 process; A1 conclusion.



Ratio Notation, Simplifying and Sharing

EXAM PRACTICE • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Total parts=12; one part= $60 \div 12 = 5$; cats= $7 \times 5 = 35$.	3	M1 setup; M1 process; A1 conclusion.
2	One part= $450 \div 5 = 90$ g; butter= $3 \times 90 = 270$ g.	3	M1 setup; M1 process; A1 conclusion.
3	Total parts=8; one part=£120; shares £600 and £360; difference £240.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
4	Total parts=7; $2.1 \div 7 = 0.3$ L squash.	3	M1 setup; M1 process; A1 conclusion.
5	Total parts=9; $180 \div 9 = 20^\circ$; angles 40° , 60° , 80° .	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
6	Total parts=11; one part=9; numbers 36 and 63.	3	M1 setup; M1 process; A1 conclusion.
7	Difference=5 parts; one part= $35 \div 5 = 7$; numbers 21 and 56.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
8	One part= $84 \div 7 = 12$; initial boys= $6 \times 12 = 72$. After 12 leave: 60:84; divide by 12 $\rightarrow$ 5:7.	3	M1 setup; M1 process; A1 conclusion.



Ratio Notation, Simplifying and Sharing

EXAM PRACTICE • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	3 parts=24, so one part=8; total parts=12; total=96.	3	M1 setup; M1 process; A1 conclusion.
10	A red fraction= $3/5=0.6$; $B=7/12\approx0.583$; Paint A.	3	M1 setup; M1 process; A1 conclusion.
11	A unit cost= $\pounds 8.10\div 6=\pounds 1.35$; $B=\pounds 13.20\div 10=\pounds 1.32$; Shop B by 3p each.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
12	$\pounds 3.15\div 7.5=\pounds 0.42$ per 100 g; $\pounds 4.80\div 12=\pounds 0.40$; 1.2 kg box is better value.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
13	LCM for y is 15. $x:y=6:15$ and $y:z=15:20$; $x:y:z=6:15:20$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
14	LCM for b is 18. $a:b=8:18$ and $b:c=18:15$; ratio 8:18:15.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
15	Total parts=8; one part=8; $\pounds 1$ coins=24, 50p coins=40; value= $\pounds 24+\pounds 20=\pounds 44$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Ratio Notation, Simplifying and Sharing

GRADE 4-5 CHALLENGE - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Difference $C - A = 5$ parts = £210; one part = £42; total 12 parts = £504.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
2	5 parts = 40, so one part = 8; initial red = 24. New red = 30; $30:40 = 3:4$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
3	$2(L+W) = 88$, so $L+W = 44$. 11 parts = 44; one part = 4; $L = 28$, $W = 16$; area = 448 cm^2 .	5	M1 setup; M2-M4 development; A1 conclusion.
4	Let one part = k : boys = $5k$, girls = $7k$. $5k + 4 = 7k - 2$; $2k = 6$; $k = 3$. Original total = $12k = 36$.	5	M1 setup; M2-M4 development; A1 conclusion.
5	Let amounts $2k$ and $7k$. $2k/(7k+300) = 1/4$; $8k = 7k + 300$; $k = 300$. Original = $9k = 2700 \text{ ml}$.	5	M1 setup; M2-M4 development; A1 conclusion.
6	Amounts $4k$ and $7k$. $4k + 45 = 7k - 45$; $3k = 90$; $k = 30$. Total = $11k = £330$.	5	M1 setup; M2-M4 development; A1 conclusion.
7	8 parts = 80, one part = 10; original adults = 30. Check: $30 + 18 = 48$ and $48:80 = 3:5$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
8	Combine: red:blue = $8:12$ and blue:green = $12:15$, so $8:12:15$. One part = $75 \div 15 = 5$; total = $35 \times 5 = 175$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
9	First = $3/5 = 60\%$; second = $5/8 = 62.5\%$; second by 2.5 percentage points.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
10	Let red = $4k$ and blue = $7k$. $4k/(7k-18) = 2/3$; $12k = 14k - 36$; $k = 18$. Red = 72, blue = 126. Check $72:108 = 2:3$.	5	M1 setup; M2-M4 development; A1 conclusion.



Ratio Notation, Simplifying and Sharing

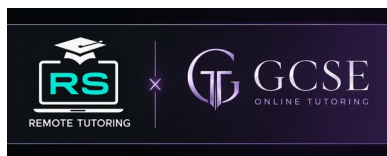
MIXED RETRIEVAL - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	HCF=18; $54:72 = 3:4$.	2	M1 method; A1 answer.
2	Total parts=11; one part=£12; shares £60 and £72.	2	M1 method; A1 answer.
3	Total parts=10; blue fraction= $\frac{7}{10}$.	1	B1: correct result or statement.
4	Make $q=9$: $p:q=4:9$ and $q:r=9:15$, so $4:9:15$.	3	M1 setup; M1 process; A1 conclusion.
5	Total parts=7; one part= $1.4 \div 7 = 0.2$ L; water= $5 \times 0.2 = 1.0$ L.	2	M1 method; A1 answer.



Scale, Recipes and Proportion

CORE SKILLS • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Constant $k=8 \div 2=4$; $y=4 \times 5=20$.	2	M1 method; A1 answer.
2	Constant $k=18 \div 3=6$; $y=6 \times 7=42$.	2	M1 method; A1 answer.
3	Constant $k=20 \div 4=5$; $y=5 \times 9=45$.	2	M1 method; A1 answer.
4	Constant $k=15 \div 5=3$; $y=3 \times 8=24$.	2	M1 method; A1 answer.
5	Constant $k=14 \div 7=2$; $y=2 \times 11=22$.	2	M1 method; A1 answer.
6	Per person $=240 \div 4=60$ g; for 10: 600 g.	2	M1 method; A1 answer.
7	Per person $=330 \div 6=55$ g; for 15: 825 g.	2	M1 method; A1 answer.
8	Per person $=275 \div 5=55$ g; for 12: 660 g.	2	M1 method; A1 answer.



Scale, Recipes and Proportion

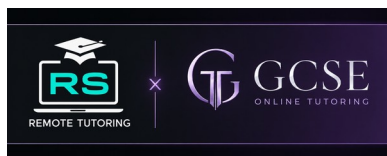
CORE SKILLS • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	Per cm = $5 \div 2 = 2.5$ km; distance = $7 \times 2.5 = 17.5$ km.	2	M1 method; A1 answer.
10	Per cm = $12 \div 3 = 4$ km; distance = $8 \times 4 = 32$ km.	2	M1 method; A1 answer.
11	Per cm = $18 \div 4 = 4.5$ km; distance = $11 \times 4.5 = 49.5$ km.	2	M1 method; A1 answer.
12	Actual = $3.6 \times 50,000 = 180,000$ cm; $\div 100 = 1800$ m.	3	M1 setup; M1 process; A1 conclusion.
13	Actual = $8.4 \times 25,000 = 210,000$ cm; $\div 100 = 2100$ m.	3	M1 setup; M1 process; A1 conclusion.
14	$6/15 = x/35$; $x = 35 \times 6 \div 15 = 14$.	2	M1 method; A1 answer.
15	Machines $\times$ time constant: $8 \times 6 = 48$; time = $48 \div 12 = 4$ hours.	3	M1 setup; M1 process; A1 conclusion.



Scale, Recipes and Proportion

EXAM PRACTICE • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Amount= $420 \times 14 / 6 = 980$ g.	3	M1 setup; M1 process; A1 conclusion.
2	Amount= $600 \times 20 / 8 = 1500$ g.	3	M1 setup; M1 process; A1 conclusion.
3	Amount= $350 \times 18 / 5 = 1260$ g.	3	M1 setup; M1 process; A1 conclusion.
4	$6.5 \times 40,000 = 260,000$ cm; $\div 100,000 = 2.6$ km.	3	M1 setup; M1 process; A1 conclusion.
5	$4.8 \times 125,000 = 600,000$ cm; $\div 100,000 = 6$ km.	3	M1 setup; M1 process; A1 conclusion.
6	$9.2 \times 20,000 = 184,000$ cm; $\div 100,000 = 1.84$ km.	3	M1 setup; M1 process; A1 conclusion.
7	$k = y/x = 30 \div 4 = 7.5$; $y = kx = 7.5 \times 11 = 82.5$.	3	M1 setup; M1 process; A1 conclusion.
8	$k = y/x = 42 \div 6 = 7$; $y = kx = 7 \times 15 = 105$.	3	M1 setup; M1 process; A1 conclusion.



Scale, Recipes and Proportion

EXAM PRACTICE • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	$k=y/x=52\div8=6.5$; $y=kx=6.5\times18=117$.	3	M1 setup; M1 process; A1 conclusion.
10	Inverse proportion: total worker-hours= $5\times12=60$; time= $60\div8=7.5$ hours.	3	M1 setup; M1 process; A1 conclusion.
11	Inverse proportion: total worker-hours= $6\times15=90$; time= $90\div10=9$ hours.	3	M1 setup; M1 process; A1 conclusion.
12	Inverse proportion: total worker-hours= $4\times21=84$; time= $84\div7=12$ hours.	3	M1 setup; M1 process; A1 conclusion.
13	Scale factor= $5/2=2.5$; width= $8\times2.5=20$ cm.	2	M1 method; A1 answer.
14	$18\times24=432$ cm= 4.32 m.	3	M1 setup; M1 process; A1 conclusion.
15	Unit cost= $\pounds8.40\div3.5=\pounds2.40/\text{kg}$; cost= $6\times\pounds2.40=\pounds14.40$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Scale, Recipes and Proportion

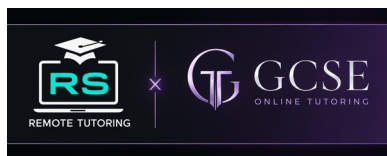
GRADE 4-5 CHALLENGE - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	3 parts=1.8 kg; one part=0.6 kg; total 10 parts=6 kg.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
2	Sides=2100 m and 1800 m; area=3,780,000 m ² =378 ha.	5	M1 setup; M2-M4 development; A1 conclusion.
3	$k=7.5/12=0.625$; $x=18.75/0.625=30$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
4	$pq=72$; $p=72/10=7.2$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
5	Distance constant= $50 \times 6=300$ miles; time= $300 \div 75=4$ hours.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
6	Actual length=12 m. Width= $48 \div 12=4$ m=400 cm; plan width= $400 \div 200=2$ cm.	5	M1 setup; M2-M4 development; A1 conclusion.
7	Work= $12 \times 35=420$ pump-min. Done=120; left=300. Seven pumps take $300/7=42 \frac{6}{7}$ min; total= $52 \frac{6}{7}$ min ≈ 52.9 .	5	M1 setup; M2-M4 development; A1 conclusion.
8	Milk per portion= $300/8=37.5$ ml; $1650/37.5=44$ portions.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
9	Area scale factor= $1.5^2=2.25$; new area= $32 \times 2.25=72$ cm ² .	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
10	Same multiplier 1.20; $y=45 \times 1.2=54$.	3	M1 setup; M1 process; A1 conclusion.



Scale, Recipes and Proportion

MIXED RETRIEVAL - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	$180 \times 10 / 4 = 450 \text{ g.}$	2	M1 method; A1 answer.
2	$7.2 \times 25000 = 180000 \text{ cm} = 1800 \text{ m.}$	3	M1 setup; M1 process; A1 conclusion.
3	$k=4; y=36.$	2	M1 method; A1 answer.
4	$6 \times 8 \div 12 = 4 \text{ hours.}$	2	M1 method; A1 answer.
5	$14 \times 30 = 420 \text{ cm} = 4.2 \text{ m.}$	2	M1 method; A1 answer.



Rates and Compound Measures

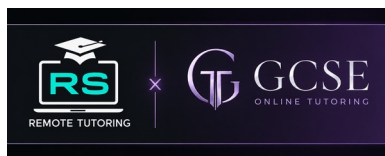
CORE SKILLS • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	speed=distance÷time=150÷3=50 km/h.	2	M1 method; A1 answer.
2	speed=distance÷time=84÷1.4=60 km/h.	2	M1 method; A1 answer.
3	speed=distance÷time=225÷4.5=50 km/h.	2	M1 method; A1 answer.
4	speed=distance÷time=96÷1.5=64 km/h.	2	M1 method; A1 answer.
5	speed=distance÷time=42÷0.7=60 km/h.	2	M1 method; A1 answer.
6	density=mass÷volume=540÷60=9 g/cm ³ .	2	M1 method; A1 answer.
7	density=mass÷volume=1260÷140=9 g/cm ³ .	2	M1 method; A1 answer.
8	density=mass÷volume=875÷125=7 g/cm ³ .	2	M1 method; A1 answer.



Rates and Compound Measures

CORE SKILLS • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	pressure=force÷area=480÷60=8 N/m ² .	2	M1 method; A1 answer.
10	pressure=force÷area=735÷105=7 N/m ² .	2	M1 method; A1 answer.
11	pressure=force÷area=960÷120=8 N/m ² .	2	M1 method; A1 answer.
12	72÷3.6=20 m/s.	2	M1 method; A1 answer.
13	15×3.6=54 km/h.	2	M1 method; A1 answer.
14	18÷2.5=7.2 L/min.	2	M1 method; A1 answer.
15	£3.60÷7.5=£0.48 per 100 g.	2	M1 method; A1 answer.



Rates and Compound Measures

EXAM PRACTICE • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	distance=speed×time=68×2.75=187 km.	3	M1 setup; M1 process; A1 conclusion.
2	distance=speed×time=52×3.5=182 km.	3	M1 setup; M1 process; A1 conclusion.
3	distance=speed×time=75×1.8=135 km.	3	M1 setup; M1 process; A1 conclusion.
4	time=distance÷speed=315÷70=4.5 hours.	3	M1 setup; M1 process; A1 conclusion.
5	time=distance÷speed=264÷48=5.5 hours.	3	M1 setup; M1 process; A1 conclusion.
6	time=distance÷speed=187.5÷62.5=3 hours.	3	M1 setup; M1 process; A1 conclusion.
7	mass=density×volume=7.8×45=351 g.	3	M1 setup; M1 process; A1 conclusion.
8	1.26 kg=1260 g; volume=mass÷density=1260÷0.9=1400 cm ³ .	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Rates and Compound Measures

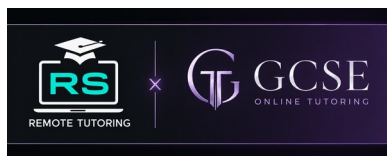
EXAM PRACTICE • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	$\text{force} = \text{pressure} \times \text{area} = 2400 \times 0.35 = 840 \text{ N.}$	3	M1 setup; M1 process; A1 conclusion.
10	$\text{area} = \text{force} \div \text{pressure} = 1500 \div 6000 = 0.25 \text{ m}^2.$	3	M1 setup; M1 process; A1 conclusion.
11	$\pounds 4.35 \div 1.5 = \pounds 2.90/\text{kg}; \pounds 2.70 \div 0.9 = \pounds 3/\text{kg}; 1.5 \text{ kg bag.}$	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
12	Rate = 30 L/min; in 60 min = 1800 L.	3	M1 setup; M1 process; A1 conclusion.
13	45 min = 0.75 h; speed = $18 \div 0.75 = 24 \text{ km/h.}$	3	M1 setup; M1 process; A1 conclusion.
14	Times 2 h and 2 h; total 300 km/4 h = 75 km/h.	5	M1 setup; M2-M4 development; A1 conclusion.
15	$840 \div 12 = 70 \text{ pages/min}; 70 \div 60 = 7/6 \approx 1.17 \text{ pages/s.}$	3	M1 setup; M1 process; A1 conclusion.



Rates and Compound Measures

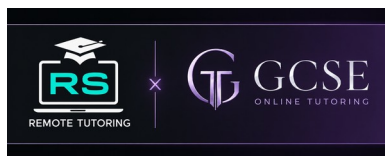
GRADE 4-5 CHALLENGE - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Times=5/12 h and 3/9=1/3 h; total=3/4 h; average=8÷0.75=10 2/3 km/h.	5	M1 setup; M2-M4 development; A1 conclusion.
2	Volume=120 cm ³ ; density=936÷120=7.8 g/cm ³ .	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
3	Material volume=180 cm ³ ; mass=1440 g; density=8 g/cm ³ .	5	M1 setup; M2-M4 development; A1 conclusion.
4	18 kN=18000 N; area=0.15 m ² ; pressure=120000 N/m ² .	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
5	Times=2 h and 3 h; total distance=300; average=300/5=60 km/h.	5	M1 setup; M2-M4 development; A1 conclusion.
6	Gallons=235/47=5; litres=22.5; cost=22.5×1.52=£34.20.	5	M1 setup; M2-M4 development; A1 conclusion.
7	Net rate=24.5 L/min; time=980/24.5=40 min.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
8	Net=13 L/min; time=520/13=40 min.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
9	Mass=5400 g; volume=5400/2.7=2000 cm ³ ; height=2000/(300)=6 2/3 cm.	5	M1 setup; M2-M4 development; A1 conclusion.
10	Old rate=150/h; new=168/h; in 8 h=1344 items.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Rates and Compound Measures

MIXED RETRIEVAL - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	$144/2.4=60$ km/h.	2	M1 method; A1 answer.
2	$4.5 \times 80=360$ g.	2	M1 method; A1 answer.
3	$900/30=30$ N/m ² .	2	M1 method; A1 answer.
4	$25 \times 3.6=90$ km/h.	2	M1 method; A1 answer.
5	20 lots of 100 g; $\pounds 5.40/20=\pounds 0.27$.	2	M1 method; A1 answer.



Percentage Change, Growth and Decay

CORE SKILLS • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Multiplier= $1 + 15/100 = 1.15$; new= $240 \times 1.15 = £276.00$.	2	M1 method; A1 answer.
2	Multiplier= $1 + 8/100 = 1.08$; new= $360 \times 1.08 = £388.80$.	2	M1 method; A1 answer.
3	Multiplier= $1 + 12/100 = 1.12$; new= $1250 \times 1.12 = £1400.00$.	2	M1 method; A1 answer.
4	Multiplier= $1 + 25/100 = 1.25$; new= $84 \times 1.25 = £105.00$.	2	M1 method; A1 answer.
5	Multiplier= $1 + 35/100 = 1.35$; new= $560 \times 1.35 = £756.00$.	2	M1 method; A1 answer.
6	Multiplier= $1 - 20/100 = 0.8$; new= $180 \times 0.8 = £144.00$.	2	M1 method; A1 answer.
7	Multiplier= $1 - 12/100 = 0.88$; new= $450 \times 0.88 = £396.00$.	2	M1 method; A1 answer.
8	Multiplier= $1 - 15/100 = 0.85$; new= $96 \times 0.85 = £81.60$.	2	M1 method; A1 answer.



Percentage Change, Growth and Decay

CORE SKILLS • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	Multiplier = $1 - 5/100 = 0.95$; new = $720 \times 0.95 = \text{£}684.00$.	2	M1 method; A1 answer.
10	Multiplier = $1 - 32/100 = 0.68$; new = $250 \times 0.68 = \text{£}170.00$.	2	M1 method; A1 answer.
11	Change = 12; percentage = $12/80 \times 100 = 15\%$.	2	M1 method; A1 answer.
12	Change = 80; $80/640 \times 100 = 12.5\%$.	2	M1 method; A1 answer.
13	Original = $56 \div 0.80 = \text{£}70$.	3	M1 setup; M1 process; A1 conclusion.
14	Original = $138 \div 1.15 = \text{£}120$.	3	M1 setup; M1 process; A1 conclusion.
15	Interest = $900 \times 0.04 \times 3 = \text{£}108$.	3	M1 setup; M1 process; A1 conclusion.



Percentage Change, Growth and Decay

EXAM PRACTICE • PART A - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Final = $500 \times 1.04^3 = \text{£}562.43$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
2	Final = $1200 \times 1.03^5 = \text{£}1391.13$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
3	Final = $850 \times 1.06^2 = \text{£}955.06$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
4	Final = $2000 \times 1.025^4 = \text{£}2207.63$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
5	Value = $24000 \times 0.88^3 = \text{£}16355.33$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
6	Value = $1800 \times 0.82^2 = \text{£}1210.32$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
7	Value = $650 \times 0.91^4 = \text{£}445.74$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
8	$160 \times 1.25 \times 0.80 = \text{£}160$; the changes cancel for this pair of multipliers.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Percentage Change, Growth and Decay

EXAM PRACTICE • PART B - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
9	Increase = $28000 \times 0.035 = £980$; new = $£28,980$.	3	M1 setup; M1 process; A1 conclusion.
10	$72 \times 1.20 = £86.40$.	2	M1 method; A1 answer.
11	$91 \div 0.70 = £130$.	3	M1 setup; M1 process; A1 conclusion.
12	Change = 4320; $4320/48000 \times 100 = 9\%$.	3	M1 setup; M1 process; A1 conclusion.
13	Multiplier = $1.05 \times 1.08 = 1.134$; increase = 13.4%.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
14	Multiplier = $0.90 \times 0.85 = 0.765$; decrease = 23.5%.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
15	rate = $150/(750 \times 5) = 0.04 = 4\%$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.



Percentage Change, Growth and Decay

GRADE 4-5 CHALLENGE - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: _____ / _____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	Multiplier= $1.2 \times 0.8 = 0.96$; final is 96% of original, a 4% decrease.	3	M1 setup; M1 process; A1 conclusion.
2	Start= $2205 \div 1.05^2 = £2000$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
3	Original= $14580 \div 0.9^2 = £18,000$.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
4	$80000 \times 1.03^4 \approx 90040.7$; first exceeds after 4 years.	5	M1 setup; M2-M4 development; A1 conclusion.
5	Principal= $5000 \div 1.04^6 \approx £3951.57$.	5	M1 setup; M2-M4 development; A1 conclusion.
6	Selling= $75 \times 1.4 \times 0.85 = £89.25$; profit= $£14.25$; $14.25/75 \times 100 = 19\%$.	5	M1 setup; M2-M4 development; A1 conclusion.
7	Original= $13778.08 \div 0.82^3 \approx £24,988.90$.	5	M1 setup; M2-M4 development; A1 conclusion.
8	$1 + p/100 = 1.32$; $p = 32$.	2	M1 method; A1 answer.
9	25% off gives £180; £55 off gives £185; first is cheaper by £5.	4	M1 setup; M1 development; A1 accuracy; A1 conclusion.
10	Compound= $3000 \times 1.038^5 \approx £3615.00$; simple= $3000 + 3000 \times .04 \times 5 = £3600$; compound by £15.00.	5	M1 setup; M2-M4 development; A1 conclusion.



Percentage Change, Growth and Decay

MIXED RETRIEVAL - ANSWERS

FOUNDATION TIER • SHOW CLEAR WORKING • WRITE UNITS WHERE REQUIRED

Name: _____ Date: _____ Score: ____ / ____

Use the formula/method guides in the consolidated solutions section. Award method marks where the setup is correct.

Q	Answer / concise method	Mark s	Check
1	$320 \times 1.12 = \text{£}358.40.$	2	M1 method; A1 answer.
2	$450 \times 0.82 = \text{£}369.$	2	M1 method; A1 answer.
3	$30/200 \times 100 = 15\%.$	2	M1 method; A1 answer.
4	$90/0.75 = \text{£}120.$	3	M1 setup; M1 process; A1 conclusion.
5	$1000 \times 1.05^2 = \text{£}1102.50.$	3	M1 setup; M1 process; A1 conclusion.