

GCSE MATHEMATICS

Aligned to Pearson Edexcel GCSE Mathematics (1MA1)

FOUNDATION TIER

ALGEBRA

PRACTICE BOOK

Modules 09–16 | 360 original questions

Formula guides, full worked answers and marking guidance

FREE WEBSITE EDITION

Student name: _____

Target grade: _____ Start date: _____ Completion: _____

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MODULE 09-16 / A1-A12, A14, A17-A19, A21-A25

Unit 2 Contents and Study Plan

8 MODULES | 360 ORIGINAL QUESTIONS

Name: _____ Date: _____ Score: ____ / ____

Complete Core Skills, Exam Practice, Grade 4-5 Challenge and same-topic retrieval in every module. Formula and method guides, full worked answers and marking guidance are collected at the back.

MODULE	TOPIC	SPECIFICATION	SCORE
09	Algebra Notation and Substitution	A1, A2, A3	__ / __
10	Simplifying, Expanding and Factorising	A4, A6	__ / __
11	Formulae and Linear Equations	A5, A17, A21	__ / __
12	Inequalities and Simultaneous Equations	A19, A22	__ / __
13	Sequences	A23, A24, A25	__ / __
14	Coordinates and Straight-Line Graphs	A8, A9, A10	__ / __
15	Quadratic and Real-Life Graphs	A11, A12, A14, A18	__ / __
16	Functions and Mixed Algebra	A7; review A1-A25	__ / __

Assessment information can change. For the current paper format, calculator rules, timing, marks and qualification details, consult the official Pearson Edexcel GCSE Mathematics (1MA1) specification on the Pearson Qualifications website.

MODULE 01-08 / A1-A12, A14, A17-A19, A21-A25

Specification Coverage Map

INDEPENDENTLY AUTHORED PRACTICE

Name: _____ Date: _____ Score: ____ / ____

This independently authored Foundation Tier practice book is organised around the skills represented by Pearson Edexcel GCSE Mathematics (1MA1) content references A1-A12, A14, A17-A19, A21-A25. The reference identifies specification alignment only; the questions, data, diagrams and worked solutions in this book are independently created.

Pearson Edexcel is referenced only to identify the qualification for which this resource is intended. This publication does not reproduce Pearson Edexcel question papers, mark schemes, examiner reports, sample assessment materials or specification text.

For the official and most recent specification, assessment structure and Pearson Edexcel materials, use the Pearson Qualifications website directly. Do not rely on this independent resource as the authoritative source of qualification rules.

Practice emphasis: Algebraic notation, manipulation, substitution, equations, inequalities, sequences, graphs and modelling. The exercises are designed as independent GCSE Mathematics practice rather than replicas of Pearson Edexcel examination questions.

A1-A7	Notation, substitution, manipulation, formulae and functions
A8-A12, A14	Coordinates, straight lines and non-linear graphs
A17-A19, A21-A25	Equations, simultaneous equations and inequalities
A23-A25	Arithmetic, geometric and special sequences; linear nth terms

MODULE 09-10 / A1-A6

Algebra Visual Reference: Notation and Manipulation

SUBSTITUTE | EXPAND | FACTORISE

STRUCTURE OF AN EXPRESSION

$$3x^2 - 5x + 7$$

coefficient

power

constant

Substitute $x = -2$ using brackets: $3(-2)^2 - 5(-2) + 7$.

EXPANDING AND FACTORISING ARE INVERSE PROCESSES

$$4(x + 3) = 4x + 12$$

$$6x + 9 = 3(2x + 3)$$

Check by expanding the factorised expression.

MODULE 11-12 / A5, A17, A19, A21, A22

Algebra Visual Reference: Equations and Inequalities

BALANCE | ELIMINATE | REPRESENT

BALANCE METHOD

$$3x + 5 = 20$$

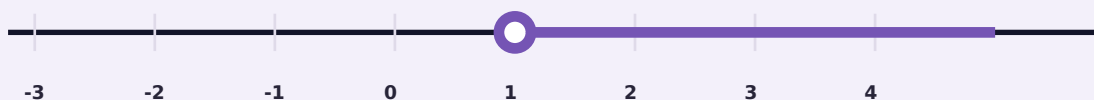
$$3x = 15$$

Subtract 5 from both sides

$$x = 5$$

Divide both sides by 3

INEQUALITY NUMBER LINE

Open endpoint at 1 and shading right represent $x > 1$.

MODULE 13-14 / A8-A10, A23-A25

Algebra Visual Reference: Sequences and Straight Lines

NTH TERM | GRADIENT | INTERCEPT

ARITHMETIC SEQUENCE

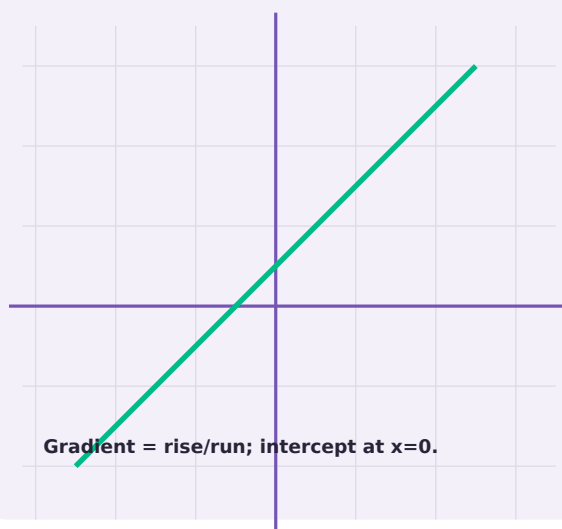
5, 9, 13, 17, ...

First difference = 4

nth term = $4n + 1$

Check $n=1$: $4(1)+1=5$.

STRAIGHT-LINE GRID



LINE EQUATION

$$y = mx + c$$

m = gradient c = y-intercept

Parallel lines share the same gradient.

MODULE 15-16 / A7, A11, A12, A14, A18

Algebra Visual Reference: Quadratics and Functions

ROOTS | TURNING POINTS | INPUT-OUTPUT

QUADRATIC GRAPH



Roots meet the x-axis; the turning point is the minimum.

FUNCTION MACHINE

INPUT x

$\times 3$

$+ 2$

OUTPUT $3x+2$

CHECKING

Substitute a proposed root, coordinate or solution into the original relation.

An identity is true for every permitted value; an equation is true only for its solutions.

Keep exact fractions unless the question asks for an approximation.

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Work out $3x + 2$ when $x = 4$. [2 marks]

2. Work out $5x + 2$ when $x = -2$. [2 marks]

3. Work out $-2x + 2$ when $x = 7$. [2 marks]

4. Work out $4x + 2$ when $x = 0$. [2 marks]

5. Work out $7x + 2$ when $x = 3$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Work out $2x + 3y$ when $x=3$ and $y=5$. [2 marks]

7. Work out $2x + 3y$ when $x=-2$ and $y=4$. [2 marks]

8. Work out $2x + 3y$ when $x=6$ and $y=-1$. [2 marks]

9. Work out $2x + 3y$ when $x=0$ and $y=7$. [2 marks]

10. Work out $2x + 3y$ when $x=8$ and $y=2$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Write $a \times a \times a \times b$ in index notation. [1 mark]

12. Write $7 \times p$ using algebraic notation. [1 mark]

13. Write $x \div 5$ as an algebraic fraction. [1 mark]

14. State whether $4x+3$ is an expression, equation, formula or inequality. [1 mark]

15. In $9a-5$, state the coefficient of a . [1 mark]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. A number x is multiplied by 3 then decreased by 4. Write an expression using x . [2 marks]

17. A number x is multiplied by 3 then decreased by 6. Write an expression using x . [2 marks]

18. A number x is multiplied by 3 then decreased by 9. Write an expression using x . [2 marks]

19. A number x is multiplied by 3 then decreased by 12. Write an expression using x . [2 marks]

20. A number x is multiplied by 3 then decreased by 15. Write an expression using x . [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Use $P=2l+2w$ to find P when $l=7$ and $w=3$. [2 marks]

22. Use $P=2l+2w$ to find P when $l=9$ and $w=5$. [2 marks]

23. Use $P=2l+2w$ to find P when $l=12$ and $w=4$. [2 marks]

24. Use $P=2l+2w$ to find P when $l=8$ and $w=6$. [2 marks]

25. Use $P=2l+2w$ to find P when $l=11$ and $w=2$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Use $A=\pi r^2$ to find A in terms of π when $r=2$. [2 marks]

27. Use $A=\pi r^2$ to find A in terms of π when $r=3$. [2 marks]

28. Use $A=\pi r^2$ to find A in terms of π when $r=4$. [2 marks]

29. Use $A=\pi r^2$ to find A in terms of π when $r=5$. [2 marks]

30. Use $A=\pi r^2$ to find A in terms of π when $r=6$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. A taxi costs £3 plus £1.80 per mile. Write a formula for cost C for m miles. [2 marks]

32. Three consecutive integers start with n . Write their sum in simplest form. [3 marks]

33. A rectangle has length $x+4$ and width x . Write its perimeter simply. [3 marks]

34. A bag has r red counters and twice as many blue. Write the total. [2 marks]

35. Explain why $5(x+2)$ is not equal to $5x+2$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Use $E=mc^2$ to find E when $m=3$ and $c=4$. [2 marks]

37. If $a=-2$ and $b=5$, find a^2b-3a . [3 marks]

38. Write an expression for the mean of x , $x+2$ and $x+4$. [3 marks]

39. A square has side $2x+1$. Write its perimeter. [2 marks]

40. Explain the difference between $3x^2$ and $(3x)^2$. [2 marks]

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Substitute $x = -3$ into $x^2 + 2x$. [2 marks]

42. Write “five less than twice y ” algebraically. [1 mark]

43. State the constant term in $4x + 7$. [1 mark]

44. Use $v = u + at$ for $u = 3, a = 4, t = 5$. [2 marks]

45. Write the total cost of x pens at 60p and one £2 book, in pounds. [2 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Simplify $3x + 5x$. [1 mark]

2. Simplify $7x + -2x$. [1 mark]

3. Simplify $-4x + 9x$. [1 mark]

4. Simplify $6x + 3x$. [1 mark]

5. Simplify $8x + -5x$. [1 mark]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Expand $3(2x + 5)$. [2 marks]

7. Expand $4(-x + 7)$. [2 marks]

8. Expand $6(3x + -2)$. [2 marks]

9. Expand $5(-4x + 9)$. [2 marks]

10. Expand $8(2x + 1)$. [2 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Factorise $6x + 9$. [2 marks]

12. Factorise $8x + 12$. [2 marks]

13. Factorise $10x + 15$. [2 marks]

14. Factorise $14x + 21$. [2 marks]

15. Factorise $12x + 18$. [2 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Simplify $2x + 3 + 5x - 2$. [2 marks]

17. Simplify $4x + -2 + 7x - 2$. [2 marks]

18. Simplify $3x + 6 + -x - 2$. [2 marks]

19. Simplify $5x + 1 + 4x - 2$. [2 marks]

20. Simplify $6x + -3 + 2x - 2$. [2 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Expand $(x+2)(x+3)$. [3 marks]

22. Expand $(x+4)(x+5)$. [3 marks]

23. Expand $(x+1)(x+7)$. [3 marks]

24. Expand $(x+3)(x+6)$. [3 marks]

25. Expand $(x+5)(x+2)$. [3 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Factorise x^2+5x+6 . [3 marks]

27. Factorise $x^2+10x+24$. [3 marks]

28. Factorise x^2+9x+8 . [3 marks]

29. Factorise $x^2+12x+35$. [3 marks]

30. Factorise $x^2+12x+27$. [3 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Expand and simplify $2(x+3) + 4(x-1)$. [3 marks]

32. Expand and simplify $3(x+2) + 5(x-1)$. [3 marks]

33. Expand and simplify $4(x+1) + 6(x-1)$. [3 marks]

34. Expand and simplify $5(x+2) + 3(x-1)$. [3 marks]

35. Expand and simplify $6(x+1) + 4(x-1)$. [3 marks]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Show that $3(n+2)+2(n-1)$ is equivalent to $5n+4$. [2 marks]

37. Factorise fully $12x^2+18x$. [2 marks]

38. Simplify $x^3 \times x^4$. [1 mark]

39. Simplify $y^8 \div y^3$. [1 mark]

40. Simplify $(a^2)^3$. [1 mark]

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Expand $7(2x-3)$. [2 marks]

42. Factorise $15x+25$. [2 marks]

43. Simplify $4a+3b-a+2b$. [2 marks]

44. Expand $(x+4)(x+2)$. [3 marks]

45. Factorise $x^2+9x+20$. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Solve $3x + 5 = 20$. [2 marks]

2. Solve $4x + -2 = 18$. [2 marks]

3. Solve $5x + 7 = 32$. [2 marks]

4. Solve $6x + 1 = 25$. [2 marks]

5. Solve $7x + -4 = 31$. [2 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Solve $3x+5=x+17$. [3 marks]

7. Solve $5x+2=2x+20$. [3 marks]

8. Solve $4x-3=x+12$. [3 marks]

9. Solve $6x+1=3x+16$. [3 marks]

10. Solve $7x-2=4x+13$. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Solve $2(x+3)=18$. [3 marks]

12. Solve $3(x+4)=30$. [3 marks]

13. Solve $4(x-1)=28$. [3 marks]

14. Solve $5(x+2)=45$. [3 marks]

15. Solve $6(x-3)=42$. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Make x the subject of $y=3x+5$. [2 marks]

17. Make r the subject of $C=2\pi r$. [2 marks]

18. Make h the subject of $A=bh/2$. [3 marks]

19. Make t the subject of $v=u+at$. [3 marks]

20. Make w the subject of $P=2l+2w$. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Three times a number plus 4 is 40. Form and solve an equation. [3 marks]

22. Three times a number plus 4 is 58. Form and solve an equation. [3 marks]

23. Three times a number plus 4 is 76. Form and solve an equation. [3 marks]

24. Three times a number plus 4 is 94. Form and solve an equation. [3 marks]

25. Three times a number plus 4 is 112. Form and solve an equation. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A rectangle has perimeter 26 cm and length 8 cm. Form an equation and find width. [3 marks]

27. A rectangle has perimeter 34 cm and length 10 cm. Form an equation and find width. [3 marks]

28. A rectangle has perimeter 32 cm and length 12 cm. Form an equation and find width. [3 marks]

29. A rectangle has perimeter 30 cm and length 9 cm. Form an equation and find width. [3 marks]

30. A rectangle has perimeter 36 cm and length 15 cm. Form an equation and find width. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Solve $4(x-2)+3=19$. [4 marks]

32. Solve $(x+5)/3=7$. [3 marks]

33. Make x subject of $y=(x+4)/5$. [3 marks]

34. The angles of a triangle are x , $2x$ and $3x$. Find x . [3 marks]

35. A phone plan costs £12 plus £4 per GB. A bill is £40. Find GB used. [3 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Solve $2(3x-1)=4x+10$. [4 marks]

37. Make b subject of $A=(a+b)h/2$. [4 marks]

38. A number and its half total 27. Find it. [4 marks]

39. Perimeter of regular n -gon is P . Make side s subject of $P=ns$. [2 marks]

40. Explain how to check an equation solution. [2 marks]

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Solve $5x - 7 = 18$. [2 marks]

42. Solve $3(x + 4) = 27$. [2 marks]

43. Solve $7x + 1 = 4x + 19$. [3 marks]

44. Make a the subject of $v = u + at$. [3 marks]

45. A number doubled then reduced by 3 gives 17. Find it. [3 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Solve $2x+3<11$. [2 marks]

2. Solve $3x-2<13$. [2 marks]

3. Solve $4x+5<21$. [2 marks]

4. Solve $5x-3<17$. [2 marks]

5. Solve $6x+1<25$. [2 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Solve $2x+4\geq 12$. [2 marks]

7. Solve $3x-3\geq 9$. [2 marks]

8. Solve $4x+2\geq 18$. [2 marks]

9. Solve $5x-5\geq 20$. [2 marks]

10. Solve $6x+6\geq 30$. [2 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. List the integers satisfying $-2 < x \leq 3$. [2 marks]

12. Describe $x < 4$ on a number line. [2 marks]

13. Describe $x \geq -1$ on a number line. [2 marks]

14. Solve $3(x+2) \leq 18$. [3 marks]

15. Solve $5x - 2 > 2x + 10$. [3 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Solve simultaneously: $2x+y=11$ and $x-y=1$. [4 marks]

17. Solve simultaneously: $x+y=9$ and $x-y=3$. [4 marks]

18. Solve simultaneously: $3x+y=13$ and $x-y=3$. [4 marks]

19. Solve simultaneously: $2x+y=12$ and $x-y=2$. [4 marks]

20. Solve simultaneously: $4x+y=17$ and $x-y=3$. [4 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Two numbers have sum 8 and difference -2. Form simultaneous equations and find them. [4 marks]

22. Two numbers have sum 6 and difference 2. Form simultaneous equations and find them. [4 marks]

23. Two numbers have sum 7 and difference 5. Form simultaneous equations and find them. [4 marks]

24. Two numbers have sum 9 and difference -5. Form simultaneous equations and find them. [4 marks]

25. Two numbers have sum 9 and difference 1. Form simultaneous equations and find them. [4 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Solve $-3x < 12$. [3 marks]

27. Solve $5 - 2x \geq 11$. [3 marks]

28. Solve $2 \leq 3x - 1 < 11$. [4 marks]

29. List integers satisfying $-3 < x \leq 2$. [2 marks]

30. Represent $-1 \leq x < 3$ on a number line. [2 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Solve $x+y=13$ and $2x-y=8$. [4 marks]

32. Solve $3x+2y=16$ and $x+y=6$. [4 marks]

33. Pens cost £2 and books £5. Ten items cost £32. Find each number. [5 marks]

34. Two angles total 180° and differ by 36° . Find them. [4 marks]

35. A farm has chickens and cows: 18 animals, 50 legs. Find each. [5 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Explain why multiplying an inequality by -1 reverses it. [2 marks]

37. Find greatest integer satisfying $4x+1<22$. [3 marks]

38. Solve simultaneously $y=2x+1$ and $y=10-x$. [4 marks]

39. Find possible integer pair $x+y=9$ with $x>y$ and $y\geq 3$. [3 marks]

40. A cinema sells adult £8 and child £5 tickets. 20 tickets total £127. Find numbers. [5 marks]

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Solve $2x+1<9$. [2 marks]

42. List integers satisfying $-1 \leq x < 3$. [2 marks]

43. Solve $4x-3 \geq 13$. [2 marks]

44. Solve $x+y=8$ and $x-y=2$. [3 marks]

45. Explain open versus closed circles. [2 marks]

MODULE 13 / A23, A24, A25

Sequences

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. Write the next three terms: 2, 5, 8, ... [2 marks]

2. Write the next three terms: 5, 9, 13, ... [2 marks]

3. Write the next three terms: 10, 8, 6, ... [2 marks]

4. Write the next three terms: -3, 2, 7, ... [2 marks]

5. Write the next three terms: 7, 13, 19, ... [2 marks]

MODULE 13 / A23, A24, A25

Sequences

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. Find the n th term of 3, 7, 11, ... [2 marks]

7. Find the n th term of 7, 10, 13, ... [2 marks]

8. Find the n th term of 12, 10, 8, ... [2 marks]

9. Find the n th term of -5, 1, 7, ... [2 marks]

10. Find the n th term of 9, 14, 19, ... [2 marks]

MODULE 13 / A23, A24, A25

Sequences

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Find term 20 of the sequence with n th term $3n+2$. [2 marks]

12. Find term 15 of the sequence with n th term $4n-1$. [2 marks]

13. Find term 12 of the sequence with n th term $5n+3$. [2 marks]

14. Find term 10 of the sequence with n th term $6n-4$. [2 marks]

15. Find term 9 of the sequence with n th term $7n+1$. [2 marks]

MODULE 13 / A23, A24, A25

Sequences

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. State the next two triangular numbers after 15. [2 marks]

17. State the next two square numbers after 36. [1 mark]

18. Continue 1,1,2,3,5 with three terms. [2 marks]

19. Continue 3,6,12,24 with two terms. [2 marks]

20. Find first differences of 2,5,10,17,26. [2 marks]

MODULE 13 / A23, A24, A25

Sequences

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Is 31 in the sequence $3n+1$? Show working. [3 marks]

22. Is 42 in the sequence $4n+2$? Show working. [3 marks]

23. Is 48 in the sequence $5n-2$? Show working. [3 marks]

24. Is 63 in the sequence $6n+3$? Show working. [3 marks]

25. Is 69 in the sequence $7n-1$? Show working. [3 marks]

MODULE 13 / A23, A24, A25

Sequences

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A pattern has 1 tiles at stage 0 and increases by 2 per stage. Write the stage-n rule. [2 marks]

27. A pattern has 2 tiles at stage 0 and increases by 3 per stage. Write the stage-n rule. [2 marks]

28. A pattern has 3 tiles at stage 0 and increases by 1 per stage. Write the stage-n rule. [2 marks]

29. A pattern has 4 tiles at stage 0 and increases by 2 per stage. Write the stage-n rule. [2 marks]

30. A pattern has 5 tiles at stage 0 and increases by 3 per stage. Write the stage-n rule. [2 marks]

MODULE 13 / A23, A24, A25

Sequences

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Find n th term of 11,18,25,32. [2 marks]

32. Which term of $4n-1$ is 99? [3 marks]

33. A Fibonacci-type sequence starts 2,5. Write next five terms. [3 marks]

34. Find next term of 2,6,12,20,30. [3 marks]

35. A sequence has n th term $3n+8$. Find difference between 20th and 10th terms. [3 marks]

MODULE 13 / A23, A24, A25

Sequences

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Show 100 is not in $6n+3$. [3 marks]

37. Find missing term: 4, 9, , 19, 24. [1 mark]

38. A geometric sequence starts 5 and doubles. Find 8th term. [3 marks]

39. Second differences are constant 2. What type is the sequence? [1 mark]

40. A sequence decreases by 4 from 30. Find first negative term. [3 marks]

MODULE 13 / A23, A24, A25

Sequences

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Find n th term of 5,9,13,17. [2 marks]

42. Find 20th term of $3n-2$. [2 marks]

43. Is 51 in $4n+3$? [3 marks]

44. Continue 2,3,5,8,13. [2 marks]

45. Name 1,8,27,64. [1 mark]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. State the quadrant or axis containing $(-3,4)$. [1 mark]

2. State the quadrant or axis containing $(2,-5)$. [1 mark]

3. State the quadrant or axis containing $(0,6)$. [1 mark]

4. State the quadrant or axis containing $(5,1)$. [1 mark]

5. State the quadrant or axis containing $(-4,-2)$. [1 mark]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. For $y=2x+1$, find y when $x=3$. [2 marks]

7. For $y=3x-2$, find y when $x=4$. [2 marks]

8. For $y=-x+5$, find y when $x=6$. [2 marks]

9. For $y=4x+0$, find y when $x=-2$. [2 marks]

10. For $y=0x+7$, find y when $x=10$. [2 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. State gradient and y-intercept of $y=2x+3$. [2 marks]

12. State gradient and y-intercept of $y=3x-1$. [2 marks]

13. State gradient and y-intercept of $y=-2x+4$. [2 marks]

14. State gradient and y-intercept of $y=x-5$. [2 marks]

15. State gradient and y-intercept of $y=4x+2$. [2 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Complete points for $y=2x+1$ at $x=0,1,2$. [3 marks]

17. Complete points for $y=3x-2$ at $x=0,1,2$. [3 marks]

18. Complete points for $y=-x+4$ at $x=0,1,2$. [3 marks]

19. Complete points for $y=4x+0$ at $x=0,1,2$. [3 marks]

20. Complete points for $y=x+5$ at $x=0,1,2$. [3 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Find gradient through (0,2) and (3,8). [2 marks]

22. Find gradient through (1,4) and (5,12). [2 marks]

23. Find gradient through (-2,1) and (2,9). [2 marks]

24. Find gradient through (0,-3) and (4,5). [2 marks]

25. Find gradient through (2,7) and (6,15). [2 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Find equation with gradient 3 and intercept -4 . [2 marks]

27. State a line parallel to $y=2x+5$. [2 marks]

28. Find equation through $(0,6)$ with gradient -2 . [2 marks]

29. Find x-intercept of $y=3x-12$. [2 marks]

30. Do $y=4x+1$ and $y=4x-7$ intersect? [2 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Find equation through (1,5) with gradient 2. [4 marks]

32. Find intersection of $y=2x+1$ and $y=-x+10$. [4 marks]

33. A line passes through $(-2,1)$ and $(4,13)$. Find equation. [4 marks]

34. Show $(3,11)$ lies on $y=3x+2$. [2 marks]

35. Find midpoint of $(-4,6)$ and $(8,-2)$. [3 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A line has x-intercept 4 and y-intercept 8. Find gradient. [3 marks]

37. Find missing y so gradient from (2,3) to (6,y) is 2. [3 marks]

38. Are $y=3x+1$ and $6x-2y=8$ parallel? [3 marks]

39. Find equation horizontal through (5,-2). [2 marks]

40. Find equation vertical through (-3,4). [2 marks]

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. For $y=2x+3$ find y at $x=5$. [1 mark]

42. State gradient of $y=-3x+4$. [1 mark]

43. State intercept of $y=7x-2$. [1 mark]

44. Find gradient from (1,2) to (4,8). [2 marks]

45. Write equation gradient 5, intercept 1. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. For $y=x^2-4$, find y when $x=-3$. [2 marks]

2. For $y=x^2-4$, find y when $x=-2$. [2 marks]

3. For $y=x^2-4$, find y when $x=-1$. [2 marks]

4. For $y=x^2-4$, find y when $x=0$. [2 marks]

5. For $y=x^2-4$, find y when $x=1$. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. State roots of $y=(x-2)(x-3)$. [2 marks]

7. State roots of $y=(x-1)(x-5)$. [2 marks]

8. State roots of $y=(x-4)(x-2)$. [2 marks]

9. State roots of $y=(x-3)(x-6)$. [2 marks]

10. State roots of $y=(x-5)(x-1)$. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. State turning point of $y=(x-2)^2+(1)$. [2 marks]

12. State turning point of $y=(x+3)^2+(4)$. [2 marks]

13. State turning point of $y=(x-1)^2+(-2)$. [2 marks]

14. State turning point of $y=(x-(0))^2+(5)$. [2 marks]

15. State turning point of $y=(x-(4))^2+(0)$. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Describe the shape of $y=x^2$. [2 marks]

17. Sketch key features of $y=1/x$. [3 marks]

18. State y-intercept of $y=x^2-3x+2$. [1 mark]

19. Find roots of $y=x^2-5x+6$. [3 marks]

20. State symmetry line of $y=(x-4)^2-1$. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. A distance-time graph rises uniformly from 0 to 120 km in 2 h. Find gradient and interpret it. [3 marks]

22. A distance-time graph rises uniformly from 0 to 180 km in 3 h. Find gradient and interpret it. [3 marks]

23. A distance-time graph rises uniformly from 0 to 90 km in 1.5 h. Find gradient and interpret it. [3 marks]

24. A distance-time graph rises uniformly from 0 to 240 km in 4 h. Find gradient and interpret it. [3 marks]

25. A distance-time graph rises uniformly from 0 to 150 km in 2.5 h. Find gradient and interpret it. [3 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. A journey graph is horizontal for 2 hours after travelling at 60 km/h. What does the horizontal section mean? [2 marks]

27. A journey graph is horizontal for 3 hours after travelling at 45 km/h. What does the horizontal section mean? [2 marks]

28. A journey graph is horizontal for 1.5 hours after travelling at 80 km/h. What does the horizontal section mean? [2 marks]

29. A journey graph is horizontal for 4 hours after travelling at 50 km/h. What does the horizontal section mean? [2 marks]

30. A journey graph is horizontal for 2.5 hours after travelling at 70 km/h. What does the horizontal section mean? [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Use graph idea to solve $x^2=9$. [3 marks]

32. A quadratic crosses x-axis at -2 and 5 . Write a possible equation. [3 marks]

33. Explain why $y=x^2+4$ has no real roots. [2 marks]

34. For $y=x^3$, state y at $x=-2$. [1 mark]

35. For $y=1/x$, state y at $x=0.25$. [1 mark]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. Find roots of x^2+x-12 . [3 marks]

37. A parabola has roots 1 and 6. State its symmetry line. [2 marks]

38. A distance-time graph rises 90 km in 1.5 h then is flat 30 min. Find moving speed and total elapsed time. [4 marks]

39. Sketch key features of $y=(x-2)^2-4$. [4 marks]

40. Find approximate meaning of intersection of distance-time graphs. [2 marks]

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Find roots of $x^2 - 7x + 12$. [3 marks]

42. State turning point of $(x-2)^2 + 3$. [2 marks]

43. Interpret a horizontal distance-time segment. [1 mark]

44. Find gradient: 100 km in 2 h. [2 marks]

45. State y-intercept of $x^2 + 2x - 5$. [1 mark]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

CORE SKILLS | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

1. A function multiplies input by 2 then adds 3. Find output for 4. [2 marks]

2. A function multiplies input by 3 then adds -1. Find output for 5. [2 marks]

3. A function multiplies input by -2 then adds 6. Find output for 3. [2 marks]

4. A function multiplies input by 4 then adds 2. Find output for -1. [2 marks]

5. A function multiplies input by 5 then adds -4. Find output for 2. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

CORE SKILLS | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

6. A function is $2x+3$. Find input giving output 15. [2 marks]

7. A function is $3x-1$. Find input giving output 20. [2 marks]

8. A function is $4x+2$. Find input giving output 30. [2 marks]

9. A function is $5x-4$. Find input giving output 21. [2 marks]

10. A function is $6x+1$. Find input giving output 43. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

CORE SKILLS | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

11. Write function machine for $3x+5$. [1 mark]

12. Find missing operation: input 4 → output 19 after $\times 4$ then ?. [2 marks]

13. Explain why function $y=2x+1$ gives odd outputs for integer x . [2 marks]

14. Use $f(x)=x^2-1$ to find $f(5)$. [2 marks]

15. Use $f(x)=3x+2$ to find $f(-4)$. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

EXAM PRACTICE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

16. Simplify $5x+3x-2$. [2 marks]

17. Expand $4(x-3)$. [2 marks]

18. Factorise $6x+9$. [2 marks]

19. Solve $3x+4=19$. [2 marks]

20. Find nth term 4,7,10,13. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

EXAM PRACTICE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

21. Solve $x+y=10$ and $x-y=4$. [3 marks]

22. Solve $2x-1<9$. [2 marks]

23. State gradient of $y=3x-7$. [1 mark]

24. Find roots $x^2-5x+6=0$. [3 marks]

25. Make r subject of $C=2\pi r$. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

EXAM PRACTICE | PART C

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

26. Substitute $x=3, y=-2$ into $2x^2+3y$. [2 marks]

27. Expand and simplify $3(x+4)+2(x-1)$. [3 marks]

28. Factorise $x^2+7x+12$. [3 marks]

29. Solve $4x+3=2x+17$. [3 marks]

30. Solve simultaneously $2x+y=11$ and $x-y=1$. [4 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

GRADE 4-5 CHALLENGE | PART A

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

31. Find nth term 8,13,18,23. [2 marks]

32. Find equation through (0,−2) gradient 4. [2 marks]

33. Find roots of $x^2-9=0$. [2 marks]

34. Solve $3x+1\leq 16$. [2 marks]

35. Use $f(x)=2x^2-3$ to find $f(4)$. [2 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

GRADE 4-5 CHALLENGE | PART B

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

36. A function maps x to $2x-3$. Find output after input is increased by 5. [3 marks]

37. Show $2(3x+1)-x$ is equivalent to $5x+2$. [2 marks]

38. A sequence n th term is $5n-2$. Find first term above 100. [4 marks]

39. Line $y=2x+1$ and $y=-x+10$ meet. Find intersection. [4 marks]

40. Rectangle sides x and $x+3$, perimeter 30. Find sides. [4 marks]

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

SAME-TOPIC RETRIEVAL

Name: _____ Date: _____ Score: ____ / ____

Show clear working. Non-calculator methods are recommended unless a calculator is explicitly appropriate.

41. Find $f(3)$ for $f(x)=4x-1$. [1 mark]

42. Simplify $2a+5a$. [1 mark]

43. Solve $5x=35$. [1 mark]

44. Find next term 6,10,14. [1 mark]

45. State y-intercept of $y=2x+6$. [1 mark]

MODULE 09-10 / A1-A12, A14, A17-A19, A21-A25

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 09 | Algebra Notation and Substitution | A1, A2, A3

- Substitute by replacing each letter with its given value; use brackets around negative values.
- Algebraic notation writes $3x$, x^2 and $x/5$ instead of repeated operations.
- A formula links variables; substitute first, then follow the order of operations.
- Translate words carefully: “five less than twice y ” means $2y-5$.

WORKED CHECK**Use $P=2l+2w$ to find P when $l=12$ and $w=4$.**

$$P=2(12)+2(4)=32.$$

MODULE 10 | Simplifying, Expanding and Factorising | A4, A6

- Collect only like terms; powers and different letters are not like terms.
- Expand a bracket by multiplying every term inside it.
- Factorise by taking out the greatest common algebraic factor.
- To expand two binomials, multiply every term in the first bracket by every term in the second.

WORKED CHECK**Expand $(x+1)(x+7)$.**

$$x^2+8x+7.$$

MODULE 11-12 / A1-A12, A14, A17-A19, A21-A25

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 11 | Formulae and Linear Equations | A5, A17, A21

- Solve an equation by performing the same inverse operation on both sides.
- When the unknown appears on both sides, collect the variable terms on one side first.
- To rearrange a formula, undo operations in reverse order.
- Define the variable, form the equation, solve it and interpret the result in context.

WORKED CHECK**Three times a number plus 4 is 76. Form and solve an equation.** $3x+4=76$; $x=24$.**MODULE 12 | Inequalities and Simultaneous Equations | A19, A22**

- Solve inequalities like equations; reverse the sign only after multiplying or dividing by a negative.
- Use an open endpoint for $<$ or $>$ and a closed endpoint for $\leq$ or $\geq$.
- For simultaneous equations, eliminate one variable, solve, then substitute back.
- Check a simultaneous solution in both original equations.

WORKED CHECK**Two numbers have sum 7 and difference 5. Form simultaneous equations and find them.** $a+b=7$, $a-b=5$; $a=6$, $b=1$.

MODULE 13-14 / A1-A12, A14, A17-A19, A21-A25

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 13 | Sequences | A23, A24, A25

- An arithmetic sequence has a constant first difference.
- Linear n th term = (difference) n + adjustment.
- Substitute a position into the n th-term rule to find a term.
- To test membership, set the n th term equal to the value and require a positive integer n .

WORKED CHECK**Is 48 in the sequence $5n-2$? Show working.**Solve $5n-2=48$; $n=10$. Yes, it is in the sequence.**MODULE 14 | Coordinates and Straight-Line Graphs | A8, A9, A10**

- Gradient = change in $y \div$ change in x ; y -intercept is the value of y when $x=0$.
- A straight line has equation $y=mx+c$; parallel lines have equal gradients.
- Equation through a point: use $y-y_1=m(x-x_1)$, then simplify.
- Read coordinates in the order (x,y) and use all four quadrants.

WORKED CHECK**Find gradient through $(-2,1)$ and $(2,9)$.** $m=(9-1)/(2-(-2))=2$.

MODULE 15-16 / A1-A12, A14, A17-A19, A21-A25

Formula and Method Guide

LEARN | PRACTISE | CHECK

MODULE 15 | Quadratic and Real-Life Graphs | A11, A12, A14, A18

- Quadratic roots are the x-values where the graph crosses the x-axis.
- For $y=(x-a)^2+b$, the turning point is (a,b) and the symmetry line is $x=a$.
- A horizontal distance-time section means stationary; gradient represents speed.
- Use intersections of graphs as approximate simultaneous solutions.

WORKED CHECK

A distance-time graph rises uniformly from 0 to 90 km in 1.5 h. Find gradient and interpret it.

Gradient= $90/1.5=60$ km/h, the speed.

MODULE 16 | Functions and Mixed Algebra | A7; review A1-A25

- A function maps each permitted input to one output.
- For $f(x)$, replace every x by the input value and calculate.
- Mixed algebra requires accurate notation, a clear method and a final check.
- Use substitution to verify equations, identities, roots and intersections.

WORKED CHECK

State gradient of $y=3x-7$.

3.

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $3 \times (4) + 2 = 14$. 2m
 $3 \times (4) + 2 = 14$.

02 Answer: $5 \times (-2) + 2 = -8$. 2m
 $5 \times (-2) + 2 = -8$.

03 Answer: $-2 \times (7) + 2 = -12$. 2m
 $-2 \times (7) + 2 = -12$.

04 Answer: $4 \times (0) + 2 = 2$. 2m
 $4 \times (0) + 2 = 2$.

05 Answer: $7 \times (3) + 2 = 23$. 2m
 $7 \times (3) + 2 = 23$.

06 Answer: $2(3) + 3(5) = 21$. 2m
 $2(3) + 3(5) = 21$.

07 Answer: $2(-2) + 3(4) = 8$. 2m
 $2(-2) + 3(4) = 8$.

08 Answer: $2(6) + 3(-1) = 9$. 2m
 $2(6) + 3(-1) = 9$.

09 Answer: $2(0) + 3(7) = 21$. 2m
 $2(0) + 3(7) = 21$.

10 Answer: $2(8) + 3(2) = 22$. 2m
 $2(8) + 3(2) = 22$.

11 Answer: a^3b . 1m
 a^3b .

12 Answer: $7p$. 1m
 $7p$.

13 Answer: $x/5$. 1m
 $x/5$.

14 Answer: Expression. 1m
Expression.

15 Answer: 9. 1m
9.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: $3x-4$. 2m
 $3x-4$.

17 Answer: $3x-6$. 2m
 $3x-6$.

18 Answer: $3x-9$. 2m
 $3x-9$.

19 Answer: $3x-12$. 2m
 $3x-12$.

20 Answer: $3x-15$. 2m
 $3x-15$.

21 Answer: $P=2(7)+2(3)=20$. 2m
 $P=2(7)+2(3)=20$.

22 Answer: $P=2(9)+2(5)=28$. 2m
 $P=2(9)+2(5)=28$.

23 Answer: $P=2(12)+2(4)=32$. 2m
 $P=2(12)+2(4)=32$.

24 Answer: $P=2(8)+2(6)=28$. 2m
 $P=2(8)+2(6)=28$.

25 Answer: $P=2(11)+2(2)=26$. 2m
 $P=2(11)+2(2)=26$.

26 Answer: $A=\pi \times 2^2=4\pi$. 2m
 $A=\pi \times 2^2=4\pi$.

27 Answer: $A=\pi \times 3^2=9\pi$. 2m
 $A=\pi \times 3^2=9\pi$.

28 Answer: $A=\pi \times 4^2=16\pi$. 2m
 $A=\pi \times 4^2=16\pi$.

29 Answer: $A=\pi \times 5^2=25\pi$. 2m
 $A=\pi \times 5^2=25\pi$.

30 Answer: $A=\pi \times 6^2=36\pi$. 2m
 $A=\pi \times 6^2=36\pi$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 09 / A1, A2, A3

Algebra Notation and Substitution

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $C=3+1.8m$. 2m
 $C=3+1.8m$.

32 Answer: $n+(n+1)+(n+2)=3n+3$. 3m
 $n+(n+1)+(n+2)=3n+3$.

33 Answer: $2(x+4)+2x=4x+8$. 3m
 $2(x+4)+2x=4x+8$.

34 Answer: $r+2r=3r$. 2m
 $r+2r=3r$.

35 Answer: 5 must multiply both terms: $5(x+2)=5x+10$. 2m
5 must multiply both terms: $5(x+2)=5x+10$.

36 Answer: $E=3 \times 4^2=48$. 2m
 $E=3 \times 4^2=48$.

37 Answer: $4 \times 5 + 6 = 26$. 3m
 $4 \times 5 + 6 = 26$.

38 Answer: $(3x+6)/3=x+2$. 3m
 $(3x+6)/3=x+2$.

39 Answer: $4(2x+1)=8x+4$. 2m
 $4(2x+1)=8x+4$.

40 Answer: $3x^2=3 \times x^2$; $(3x)^2=9x^2$. 2m
 $3x^2=3 \times x^2$; $(3x)^2=9x^2$.

41 Answer: $9-6=3$. 2m
 $9-6=3$.

42 Answer: $2y-5$. 1m
 $2y-5$.

43 Answer: 7. 1m
7.

44 Answer: $v=3+4 \times 5=23$. 2m
 $v=3+4 \times 5=23$.

45 Answer: $0.6x+2$. 2m
 $0.6x+2$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $8x$. 1m
 $8x$.

02 Answer: $5x$. 1m
 $5x$.

03 Answer: $5x$. 1m
 $5x$.

04 Answer: $9x$. 1m
 $9x$.

05 Answer: $3x$. 1m
 $3x$.

06 Answer: $6x + 15$. 2m
 $6x + 15$.

07 Answer: $-4x + 28$. 2m
 $-4x + 28$.

08 Answer: $18x + -12$. 2m
 $18x + -12$.

09 Answer: $-20x + 45$. 2m
 $-20x + 45$.

10 Answer: $16x + 8$. 2m
 $16x + 8$.

11 Answer: $3(2x+3)$. 2m
 $3(2x+3)$.

12 Answer: $4(2x+3)$. 2m
 $4(2x+3)$.

13 Answer: $5(2x+3)$. 2m
 $5(2x+3)$.

14 Answer: $7(2x+3)$. 2m
 $7(2x+3)$.

15 Answer: $6(2x+3)$. 2m
 $6(2x+3)$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: $7x + 1$. 2m
 $7x + 1$.

17 Answer: $1x + -4$. 2m
 $1x + -4$.

18 Answer: $2x + 4$. 2m
 $2x + 4$.

19 Answer: $9x + -1$. 2m
 $9x + -1$.

20 Answer: $8x + -5$. 2m
 $8x + -5$.

21 Answer: x^2+5x+6 . 3m
 x^2+5x+6 .

22 Answer: $x^2+9x+20$. 3m
 $x^2+9x+20$.

23 Answer: x^2+8x+7 . 3m
 x^2+8x+7 .

24 Answer: $x^2+9x+18$. 3m
 $x^2+9x+18$.

25 Answer: $x^2+7x+10$. 3m
 $x^2+7x+10$.

26 Answer: $(x+2)(x+3)$. 3m
 $(x+2)(x+3)$.

27 Answer: $(x+4)(x+6)$. 3m
 $(x+4)(x+6)$.

28 Answer: $(x+1)(x+8)$. 3m
 $(x+1)(x+8)$.

29 Answer: $(x+5)(x+7)$. 3m
 $(x+5)(x+7)$.

30 Answer: $(x+3)(x+9)$. 3m
 $(x+3)(x+9)$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 10 / A4, A6

Simplifying, Expanding and Factorising

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $6x+2$. 3m
 $6x+2$.

32 Answer: $8x+1$. 3m
 $8x+1$.

33 Answer: $10x-2$. 3m
 $10x-2$.

34 Answer: $8x+7$. 3m
 $8x+7$.

35 Answer: $10x+2$. 3m
 $10x+2$.

36 Answer: Expand: $3n+6+2n-2=5n+4$. 2m
Expand: $3n+6+2n-2=5n+4$.

37 Answer: $6x(2x+3)$. 2m
 $6x(2x+3)$.

38 Answer: x^7 . 1m
 x^7 .

39 Answer: y^5 . 1m
 y^5 .

40 Answer: a^6 . 1m
 a^6 .

41 Answer: $14x-21$. 2m
 $14x-21$.

42 Answer: $5(3x+5)$. 2m
 $5(3x+5)$.

43 Answer: $3a+5b$. 2m
 $3a+5b$.

44 Answer: x^2+6x+8 . 3m
 x^2+6x+8 .

45 Answer: $(x+4)(x+5)$. 3m
 $(x+4)(x+5)$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $3x=15$; $x=5$. 2m
 $3x=15$; $x=5$.

02 Answer: $4x=20$; $x=5$. 2m
 $4x=20$; $x=5$.

03 Answer: $5x=25$; $x=5$. 2m
 $5x=25$; $x=5$.

04 Answer: $6x=24$; $x=4$. 2m
 $6x=24$; $x=4$.

05 Answer: $7x=35$; $x=5$. 2m
 $7x=35$; $x=5$.

06 Answer: $2x=12$; $x=6$. 3m
 $2x=12$; $x=6$.

07 Answer: $3x=18$; $x=6$. 3m
 $3x=18$; $x=6$.

08 Answer: $3x=15$; $x=5$. 3m
 $3x=15$; $x=5$.

09 Answer: $3x=15$; $x=5$. 3m
 $3x=15$; $x=5$.

10 Answer: $3x=15$; $x=5$. 3m
 $3x=15$; $x=5$.

11 Answer: $x+3=9$; $x=6$. 3m
 $x+3=9$; $x=6$.

12 Answer: $x+4=10$; $x=6$. 3m
 $x+4=10$; $x=6$.

13 Answer: $x-1=7$; $x=8$. 3m
 $x-1=7$; $x=8$.

14 Answer: $x+2=9$; $x=7$. 3m
 $x+2=9$; $x=7$.

15 Answer: $x-3=7$; $x=10$. 3m
 $x-3=7$; $x=10$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: $x=(y-5)/3$. **2m**
 $x=(y-5)/3$.

17 Answer: $r=C/(2\pi)$. **2m**
 $r=C/(2\pi)$.

18 Answer: $2A=bh$; $h=2A/b$. **3m**
 $2A=bh$; $h=2A/b$.

19 Answer: $v-u=at$; $t=(v-u)/a$. **3m**
 $v-u=at$; $t=(v-u)/a$.

20 Answer: $P-2l=2w$; $w=(P-2l)/2$. **3m**
 $P-2l=2w$; $w=(P-2l)/2$.

21 Answer: $3x+4=40$; $x=12$. **3m**
 $3x+4=40$; $x=12$.

22 Answer: $3x+4=58$; $x=18$. **3m**
 $3x+4=58$; $x=18$.

23 Answer: $3x+4=76$; $x=24$. **3m**
 $3x+4=76$; $x=24$.

24 Answer: $3x+4=94$; $x=30$. **3m**
 $3x+4=94$; $x=30$.

25 Answer: $3x+4=112$; $x=36$. **3m**
 $3x+4=112$; $x=36$.

26 Answer: $2(8)+2w=26$; $2w=10$; $w=5$ cm. **3m**
 $2(8)+2w=26$; $2w=10$; $w=5$ cm.

27 Answer: $2(10)+2w=34$; $2w=14$; $w=7$ cm. **3m**
 $2(10)+2w=34$; $2w=14$; $w=7$ cm.

28 Answer: $2(12)+2w=32$; $2w=8$; $w=4$ cm. **3m**
 $2(12)+2w=32$; $2w=8$; $w=4$ cm.

29 Answer: $2(9)+2w=30$; $2w=12$; $w=6$ cm. **3m**
 $2(9)+2w=30$; $2w=12$; $w=6$ cm.

30 Answer: $2(15)+2w=36$; $2w=6$; $w=3$ cm. **3m**
 $2(15)+2w=36$; $2w=6$; $w=3$ cm.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 11 / A5, A17, A21

Formulae and Linear Equations

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $4x-8+3=19$; $4x=24$; $x=6$. 4m
 $4x-8+3=19$; $4x=24$; $x=6$.

32 Answer: $x+5=21$; $x=16$. 3m
 $x+5=21$; $x=16$.

33 Answer: $5y=x+4$; $x=5y-4$. 3m
 $5y=x+4$; $x=5y-4$.

34 Answer: $6x=180$; $x=30^\circ$. 3m
 $6x=180$; $x=30^\circ$.

35 Answer: $12+4g=40$; $g=7$. 3m
 $12+4g=40$; $g=7$.

36 Answer: $6x-2=4x+10$; $2x=12$; $x=6$. 4m
 $6x-2=4x+10$; $2x=12$; $x=6$.

37 Answer: $2A=h(a+b)$; $2A/h=a+b$; $b=2A/h-a$. 4m
 $2A=h(a+b)$; $2A/h=a+b$; $b=2A/h-a$.

38 Answer: $x+x/2=27$; $3x/2=27$; $x=18$. 4m
 $x+x/2=27$; $3x/2=27$; $x=18$.

39 Answer: $s=P/n$. 2m
 $s=P/n$.

40 Answer: Substitute it into both sides and confirm equal values. 2m
Substitute it into both sides and confirm equal values.

41 Answer: $5x=25$; $x=5$. 2m
 $5x=25$; $x=5$.

42 Answer: $x+4=9$; $x=5$. 2m
 $x+4=9$; $x=5$.

43 Answer: $3x=18$; $x=6$. 3m
 $3x=18$; $x=6$.

44 Answer: $a=(v-u)/t$. 3m
 $a=(v-u)/t$.

45 Answer: $2x-3=17$; $x=10$. 3m
 $2x-3=17$; $x=10$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $2x < 8$; $x < 4$. 2m
 $2x < 8$; $x < 4$.

02 Answer: $3x < 15$; $x < 5$. 2m
 $3x < 15$; $x < 5$.

03 Answer: $4x < 16$; $x < 4$. 2m
 $4x < 16$; $x < 4$.

04 Answer: $5x < 20$; $x < 4$. 2m
 $5x < 20$; $x < 4$.

05 Answer: $6x < 24$; $x < 4$. 2m
 $6x < 24$; $x < 4$.

06 Answer: $2x \geq 8$; $x \geq 4$. 2m
 $2x \geq 8$; $x \geq 4$.

07 Answer: $3x \geq 12$; $x \geq 4$. 2m
 $3x \geq 12$; $x \geq 4$.

08 Answer: $4x \geq 16$; $x \geq 4$. 2m
 $4x \geq 16$; $x \geq 4$.

09 Answer: $5x \geq 25$; $x \geq 5$. 2m
 $5x \geq 25$; $x \geq 5$.

10 Answer: $6x \geq 24$; $x \geq 4$. 2m
 $6x \geq 24$; $x \geq 4$.

11 Answer: $-1, 0, 1, 2, 3$. 2m
 $-1, 0, 1, 2, 3$.

12 Answer: Open circle at 4; shade to the left. 2m
Open circle at 4; shade to the left.

13 Answer: Closed circle at -1 ; shade to the right. 2m
Closed circle at -1 ; shade to the right.

14 Answer: $x + 2 \leq 6$; $x \leq 4$. 3m
 $x + 2 \leq 6$; $x \leq 4$.

15 Answer: $3x > 12$; $x > 4$. 3m
 $3x > 12$; $x > 4$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: Eliminate a variable; $x=4$, $y=3$. 4m
Eliminate a variable; $x=4$, $y=3$.

17 Answer: Eliminate a variable; $x=6$, $y=3$. 4m
Eliminate a variable; $x=6$, $y=3$.

18 Answer: Eliminate a variable; $x=4$, $y=1$. 4m
Eliminate a variable; $x=4$, $y=1$.

19 Answer: $x=14/3$, $y=8/3$ 4m
Add the equations: $3x=14$, so $x=14/3$. Substitute into $x-y=2$ to get $y=8/3$. Both equations are satisfied exactly.

20 Answer: Eliminate a variable; $x=4$, $y=1$. 4m
Eliminate a variable; $x=4$, $y=1$.

21 Answer: $a+b=8$, $a-b=-2$; $a=3$, $b=5$. 4m
 $a+b=8$, $a-b=-2$; $a=3$, $b=5$.

22 Answer: $a+b=6$, $a-b=2$; $a=4$, $b=2$. 4m
 $a+b=6$, $a-b=2$; $a=4$, $b=2$.

23 Answer: $a+b=7$, $a-b=5$; $a=6$, $b=1$. 4m
 $a+b=7$, $a-b=5$; $a=6$, $b=1$.

24 Answer: $a+b=9$, $a-b=-5$; $a=2$, $b=7$. 4m
 $a+b=9$, $a-b=-5$; $a=2$, $b=7$.

25 Answer: $a+b=9$, $a-b=1$; $a=5$, $b=4$. 4m
 $a+b=9$, $a-b=1$; $a=5$, $b=4$.

26 Answer: Divide by -3 and reverse sign: $x > -4$. 3m
Divide by -3 and reverse sign: $x > -4$.

27 Answer: $-2x \geq 6$; divide by -2 and reverse: $x \leq -3$. 3m
 $-2x \geq 6$; divide by -2 and reverse: $x \leq -3$.

28 Answer: $3 \leq 3x < 12$; $1 \leq x < 4$. 4m
 $3 \leq 3x < 12$; $1 \leq x < 4$.

29 Answer: $-2, -1, 0, 1, 2$. 2m
 $-2, -1, 0, 1, 2$.

30 Answer: Closed at -1 , open at 3 , shade between. 2m
Closed at -1 , open at 3 , shade between.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 12 / A19, A22

Inequalities and Simultaneous Equations

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: Add: $3x=21$; $x=7, y=6$. 4m
Add: $3x=21$; $x=7, y=6$.

32 Answer: Subtract $2(x+y)=12$; $x=4$; $y=2$. 4m
Subtract $2(x+y)=12$; $x=4$; $y=2$.

33 Answer: $p+b=10$; $2p+5b=32$; $b=4, p=6$. 5m
 $p+b=10$; $2p+5b=32$; $b=4, p=6$.

34 Answer: $a+b=180$; $a-b=36$; $a=108, b=72$. 4m
 $a+b=180$; $a-b=36$; $a=108, b=72$.

35 Answer: $c+w=18$; $2c+4w=50$; $w=7, c=11$. 5m
 $c+w=18$; $2c+4w=50$; $w=7, c=11$.

36 Answer: Order reverses under reflection about zero; e.g. $2<5$ but $-2>-5$. 2m
Order reverses under reflection about zero; e.g. $2<5$ but $-2>-5$.

37 Answer: $x<21/4=5.25$; greatest integer 5. 3m
 $x<21/4=5.25$; greatest integer 5.

38 Answer: $2x+1=10-x$; $x=3, y=7$. 4m
 $2x+1=10-x$; $x=3, y=7$.

39 Answer: For example $x=6, y=3$ (also 5, 4). 3m
For example $x=6, y=3$ (also 5, 4).

40 Answer: $a+c=20$; $8a+5c=127$; $3a=27$; $a=9, c=11$. 5m
 $a+c=20$; $8a+5c=127$; $3a=27$; $a=9, c=11$.

41 Answer: $x<4$. 2m
 $x<4$.

42 Answer: $-1, 0, 1, 2$. 2m
 $-1, 0, 1, 2$.

43 Answer: $x\geq 4$. 2m
 $x\geq 4$.

44 Answer: $2x=10$; $x=5, y=3$. 3m
 $2x=10$; $x=5, y=3$.

45 Answer: Open excludes boundary ($<$ or $>$); closed includes it ($\leq$ or $\geq$). 2m
Open excludes boundary ($<$ or $>$); closed includes it ($\leq$ or $\geq$).

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 13 / A23, A24, A25

Sequences

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|---|-----------|
| 01 | Answer: 11, 14, 17.
11, 14, 17. | 2m |
| 02 | Answer: 17, 21, 25.
17, 21, 25. | 2m |
| 03 | Answer: 4, 2, 0.
4, 2, 0. | 2m |
| 04 | Answer: 12, 17, 22.
12, 17, 22. | 2m |
| 05 | Answer: 25, 31, 37.
25, 31, 37. | 2m |
| 06 | Answer: $4n-1$.
$4n-1$. | 2m |
| 07 | Answer: $3n+4$.
$3n+4$. | 2m |
| 08 | Answer: $-2n+14$.
$-2n+14$. | 2m |
| 09 | Answer: $6n-11$.
$6n-11$. | 2m |
| 10 | Answer: $5n+4$.
$5n+4$. | 2m |
| 11 | Answer: $3 \times 20 + 2 = 62$.
$3 \times 20 + 2 = 62$. | 2m |
| 12 | Answer: $4 \times 15 - 1 = 59$.
$4 \times 15 - 1 = 59$. | 2m |
| 13 | Answer: $5 \times 12 + 3 = 63$.
$5 \times 12 + 3 = 63$. | 2m |
| 14 | Answer: $6 \times 10 - 4 = 56$.
$6 \times 10 - 4 = 56$. | 2m |
| 15 | Answer: $7 \times 9 + 1 = 64$.
$7 \times 9 + 1 = 64$. | 2m |

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 13 / A23, A24, A25

Sequences

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: 21, 28. 2m
21, 28.

17 Answer: 49, 64. 1m
49, 64.

18 Answer: 8,13,21. 2m
8,13,21.

19 Answer: 48,96. 2m
48,96.

20 Answer: 3,5,7,9. 2m
3,5,7,9.

21 Answer: Solve $3n+1=31$; $n=10$. Yes, it is in the sequence. 3m
Solve $3n+1=31$; $n=10$. Yes, it is in the sequence.

22 Answer: Solve $4n+2=42$; $n=10$. Yes, it is in the sequence. 3m
Solve $4n+2=42$; $n=10$. Yes, it is in the sequence.

23 Answer: Solve $5n-2=48$; $n=10$. Yes, it is in the sequence. 3m
Solve $5n-2=48$; $n=10$. Yes, it is in the sequence.

24 Answer: Solve $6n+3=63$; $n=10$. Yes, it is in the sequence. 3m
Solve $6n+3=63$; $n=10$. Yes, it is in the sequence.

25 Answer: Solve $7n-1=69$; $n=10$. Yes, it is in the sequence. 3m
Solve $7n-1=69$; $n=10$. Yes, it is in the sequence.

26 Answer: $2n+1$. 2m
 $2n+1$.

27 Answer: $3n+2$. 2m
 $3n+2$.

28 Answer: $1n+3$. 2m
 $1n+3$.

29 Answer: $2n+4$. 2m
 $2n+4$.

30 Answer: $3n+5$. 2m
 $3n+5$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 13 / A23, A24, A25

Sequences

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $7n+4$. 2m
 $7n+4$.

32 Answer: $4n-1=99$; $n=25$. 3m
 $4n-1=99$; $n=25$.

33 Answer: 7,12,19,31,50. 3m
7,12,19,31,50.

34 Answer: 42 (products $n(n+1)$). 3m
42 (products $n(n+1)$).

35 Answer: $(68)-(38)=30$. 3m
 $(68)-(38)=30$.

36 Answer: $6n+3=100$ gives $n=97/6$, not integer. 3m
 $6n+3=100$ gives $n=97/6$, not integer.

37 Answer: 14. 1m
14.

38 Answer: $5 \times 2^7=640$. 3m
 $5 \times 2^7=640$.

39 Answer: Quadratic. 1m
Quadratic.

40 Answer: 30,26,...,2,-2; -2 is 9th term. 3m
30,26,...,2,-2; -2 is 9th term.

41 Answer: $4n+1$. 2m
 $4n+1$.

42 Answer: 58. 2m
58.

43 Answer: $4n+3=51$; $n=12$, so yes. 3m
 $4n+3=51$; $n=12$, so yes.

44 Answer: 21,34. 2m
21,34.

45 Answer: Cube numbers. 1m
Cube numbers.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

- | | | |
|-----------|---|-----------|
| 01 | Answer: quadrant 2.
quadrant 2. | 1m |
| 02 | Answer: quadrant 4.
quadrant 4. | 1m |
| 03 | Answer: y-axis
y-axis | 1m |
| 04 | Answer: quadrant 1.
quadrant 1. | 1m |
| 05 | Answer: quadrant 3.
quadrant 3. | 1m |
| 06 | Answer: $y=2 \times 3 + 1 = 7$.
$y=2 \times 3 + 1 = 7$. | 2m |
| 07 | Answer: $y=3 \times 4 - 2 = 10$.
$y=3 \times 4 - 2 = 10$. | 2m |
| 08 | Answer: $y=-1 \times 6 + 5 = -1$.
$y=-1 \times 6 + 5 = -1$. | 2m |
| 09 | Answer: $y=4 \times -2 + 0 = -8$.
$y=4 \times -2 + 0 = -8$. | 2m |
| 10 | Answer: $y=0 \times 10 + 7 = 7$.
$y=0 \times 10 + 7 = 7$. | 2m |
| 11 | Answer: Gradient 2; y-intercept 3.
Gradient 2; y-intercept 3. | 2m |
| 12 | Answer: Gradient 3; y-intercept -1.
Gradient 3; y-intercept -1. | 2m |
| 13 | Answer: Gradient -2; y-intercept 4.
Gradient -2; y-intercept 4. | 2m |
| 14 | Answer: Gradient 1; y-intercept -5.
Gradient 1; y-intercept -5. | 2m |
| 15 | Answer: Gradient 4; y-intercept 2.
Gradient 4; y-intercept 2. | 2m |

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: (0,1), (1,3), (2,5). 3m
(0,1), (1,3), (2,5).

17 Answer: (0,-2), (1,1), (2,4). 3m
(0,-2), (1,1), (2,4).

18 Answer: (0,4), (1,3), (2,2). 3m
(0,4), (1,3), (2,2).

19 Answer: (0,0), (1,4), (2,8). 3m
(0,0), (1,4), (2,8).

20 Answer: (0,5), (1,6), (2,7). 3m
(0,5), (1,6), (2,7).

21 Answer: $m=(8-2)/(3-0)=2$. 2m
 $m=(8-2)/(3-0)=2$.

22 Answer: $m=(12-4)/(5-1)=2$. 2m
 $m=(12-4)/(5-1)=2$.

23 Answer: $m=(9-1)/(2--2)=2$. 2m
 $m=(9-1)/(2--2)=2$.

24 Answer: $m=(5--3)/(4-0)=2$. 2m
 $m=(5--3)/(4-0)=2$.

25 Answer: $m=(15-7)/(6-2)=2$. 2m
 $m=(15-7)/(6-2)=2$.

26 Answer: $y=3x-4$. 2m
 $y=3x-4$.

27 Answer: Any $y=2x+c$, e.g. $y=2x-1$. 2m
Any $y=2x+c$, e.g. $y=2x-1$.

28 Answer: $y=-2x+6$. 2m
 $y=-2x+6$.

29 Answer: $0=3x-12$; $x=4$. 2m
 $0=3x-12$; $x=4$.

30 Answer: They are distinct parallel lines, so no. 2m
They are distinct parallel lines, so no.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 14 / A8, A9, A10

Coordinates and Straight-Line Graphs

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $y-5=2(x-1)$, so $y=2x+3$. 4m
 $y-5=2(x-1)$, so $y=2x+3$.

32 Answer: $2x+1=-x+10$; $x=3, y=7$. 4m
 $2x+1=-x+10$; $x=3, y=7$.

33 Answer: $m=12/6=2$; using point gives $y=2x+5$. 4m
 $m=12/6=2$; using point gives $y=2x+5$.

34 Answer: $3 \times 3 + 2 = 11$, so yes. 2m
 $3 \times 3 + 2 = 11$, so yes.

35 Answer: $((-4+8)/2, (6-2)/2) = (2, 2)$. 3m
 $((-4+8)/2, (6-2)/2) = (2, 2)$.

36 Answer: $(0-8)/(4-0) = -2$. 3m
 $(0-8)/(4-0) = -2$.

37 Answer: $(y-3)/4=2$; $y=11$. 3m
 $(y-3)/4=2$; $y=11$.

38 Answer: Second rearranges $y=3x-4$; same gradient, so yes. 3m
Second rearranges $y=3x-4$; same gradient, so yes.

39 Answer: $y=-2$. 2m
 $y=-2$.

40 Answer: $x=-3$. 2m
 $x=-3$.

41 Answer: 13. 1m
13.

42 Answer: -3. 1m
-3.

43 Answer: -2. 1m
-2.

44 Answer: $(8-2)/(4-1)=2$. 2m
 $(8-2)/(4-1)=2$.

45 Answer: $y=5x+1$. 2m
 $y=5x+1$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $y = -3^2 - 4 = 5$. 2m
 $y = -3^2 - 4 = 5$.

02 Answer: $y = -2^2 - 4 = 0$. 2m
 $y = -2^2 - 4 = 0$.

03 Answer: $y = -1^2 - 4 = -3$. 2m
 $y = -1^2 - 4 = -3$.

04 Answer: $y = 0^2 - 4 = -4$. 2m
 $y = 0^2 - 4 = -4$.

05 Answer: $y = 1^2 - 4 = -3$. 2m
 $y = 1^2 - 4 = -3$.

06 Answer: $x = 2$ and $x = 3$. 2m
 $x = 2$ and $x = 3$.

07 Answer: $x = 1$ and $x = 5$. 2m
 $x = 1$ and $x = 5$.

08 Answer: $x = 4$ and $x = 2$. 2m
 $x = 4$ and $x = 2$.

09 Answer: $x = 3$ and $x = 6$. 2m
 $x = 3$ and $x = 6$.

10 Answer: $x = 5$ and $x = 1$. 2m
 $x = 5$ and $x = 1$.

11 Answer: $(2, 1)$. 2m
 $(2, 1)$.

12 Answer: $(-3, 4)$. 2m
 $(-3, 4)$.

13 Answer: $(1, -2)$. 2m
 $(1, -2)$.

14 Answer: $(0, 5)$. 2m
 $(0, 5)$.

15 Answer: $(4, 0)$. 2m
 $(4, 0)$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: Upward-opening parabola, symmetric about y-axis. 2m

Upward-opening parabola, symmetric about y-axis.

17 Answer: Two branches; axes are asymptotes; undefined at $x=0$. 3m

Two branches; axes are asymptotes; undefined at $x=0$.

18 Answer: At $x=0$, $y=2$. 1m

At $x=0$, $y=2$.

19 Answer: $(x-2)(x-3)=0$; roots 2 and 3. 3m

$(x-2)(x-3)=0$; roots 2 and 3.

20 Answer: $x=4$. 2m

$x=4$.

21 Answer: Gradient= $120/2=60$ km/h, the speed. 3m

Gradient= $120/2=60$ km/h, the speed.

22 Answer: Gradient= $180/3=60$ km/h, the speed. 3m

Gradient= $180/3=60$ km/h, the speed.

23 Answer: Gradient= $90/1.5=60$ km/h, the speed. 3m

Gradient= $90/1.5=60$ km/h, the speed.

24 Answer: Gradient= $240/4=60$ km/h, the speed. 3m

Gradient= $240/4=60$ km/h, the speed.

25 Answer: Gradient= $150/2.5=60$ km/h, the speed. 3m

Gradient= $150/2.5=60$ km/h, the speed.

26 Answer: Distance is unchanged; the object is stationary. 2m

Distance is unchanged; the object is stationary.

27 Answer: Distance is unchanged; the object is stationary. 2m

Distance is unchanged; the object is stationary.

28 Answer: Distance is unchanged; the object is stationary. 2m

Distance is unchanged; the object is stationary.

29 Answer: Distance is unchanged; the object is stationary. 2m

Distance is unchanged; the object is stationary.

30 Answer: Distance is unchanged; the object is stationary. 2m

Distance is unchanged; the object is stationary.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 15 / A11, A12, A14, A18

Quadratic and Real-Life Graphs

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: Intersections of $y=x^2$ and $y=9$ give $x=-3,3$. 3m
Intersections of $y=x^2$ and $y=9$ give $x=-3,3$.

32 Answer: $y=(x+2)(x-5)$. 3m
 $y=(x+2)(x-5)$.

33 Answer: $x^2 \geq 0$, so $y \geq 4$ and never reaches 0. 2m
 $x^2 \geq 0$, so $y \geq 4$ and never reaches 0.

34 Answer: -8 . 1m
 -8 .

35 Answer: 4. 1m
4.

36 Answer: $(x+4)(x-3)=0$; roots $-4,3$. 3m
 $(x+4)(x-3)=0$; roots $-4,3$.

37 Answer: Midpoint= $(1+6)/2=3.5$; $x=3.5$. 2m
Midpoint= $(1+6)/2=3.5$; $x=3.5$.

38 Answer: Speed= 60 km/h; total time= 2 h. 4m
Speed= 60 km/h; total time= 2 h.

39 Answer: Turning point $(2,-4)$; roots 0 and 4; symmetry $x=2$. 4m
Turning point $(2,-4)$; roots 0 and 4; symmetry $x=2$.

40 Answer: Both objects are at the same distance at the same time. 2m
Both objects are at the same distance at the same time.

41 Answer: $(x-3)(x-4)$; 3,4. 3m
 $(x-3)(x-4)$; 3,4.

42 Answer: $(2,3)$. 2m
 $(2,3)$.

43 Answer: Stationary. 1m
Stationary.

44 Answer: 50 km/h. 2m
50 km/h.

45 Answer: -5 . 1m
 -5 .

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

WORKED ANSWERS | QUESTIONS 1-15

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

01 Answer: $2 \times 4 + 3 = 11$. 2m
 $2 \times 4 + 3 = 11$.

02 Answer: $3 \times 5 - 1 = 14$. 2m
 $3 \times 5 - 1 = 14$.

03 Answer: $-2 \times 3 + 6 = 0$. 2m
 $-2 \times 3 + 6 = 0$.

04 Answer: $4 \times -1 + 2 = -2$. 2m
 $4 \times -1 + 2 = -2$.

05 Answer: $5 \times 2 - 4 = 6$. 2m
 $5 \times 2 - 4 = 6$.

06 Answer: $2x + 3 = 15$; $x = 6$. 2m
 $2x + 3 = 15$; $x = 6$.

07 Answer: $3x - 1 = 20$; $x = 7$. 2m
 $3x - 1 = 20$; $x = 7$.

08 Answer: $4x + 2 = 30$; $x = 7$. 2m
 $4x + 2 = 30$; $x = 7$.

09 Answer: $5x - 4 = 21$; $x = 5$. 2m
 $5x - 4 = 21$; $x = 5$.

10 Answer: $6x + 1 = 43$; $x = 7$. 2m
 $6x + 1 = 43$; $x = 7$.

11 Answer: Multiply by 3, then add 5. 1m
Multiply by 3, then add 5.

12 Answer: Add 3. 2m
Add 3.

13 Answer: $2x$ is even; even+1 is odd. 2m
 $2x$ is even; even+1 is odd.

14 Answer: $25 - 1 = 24$. 2m
 $25 - 1 = 24$.

15 Answer: $-12 + 2 = -10$. 2m
 $-12 + 2 = -10$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

WORKED ANSWERS | QUESTIONS 16-30

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

16 Answer: $8x-2$. 2m
 $8x-2$.

17 Answer: $4x-12$. 2m
 $4x-12$.

18 Answer: $3(2x+3)$. 2m
 $3(2x+3)$.

19 Answer: $x=5$. 2m
 $x=5$.

20 Answer: $3n+1$. 2m
 $3n+1$.

21 Answer: $x=7, y=3$. 3m
 $x=7, y=3$.

22 Answer: $x<5$. 2m
 $x<5$.

23 Answer: 3. 1m
3.

24 Answer: 2,3. 3m
2,3.

25 Answer: $r=C/(2\pi)$. 2m
 $r=C/(2\pi)$.

26 Answer: $18-6=12$. 2m
 $18-6=12$.

27 Answer: $5x+10$. 3m
 $5x+10$.

28 Answer: $(x+3)(x+4)$. 3m
 $(x+3)(x+4)$.

29 Answer: $2x=14$; $x=7$. 3m
 $2x=14$; $x=7$.

30 Answer: Add: $3x=12$; $x=4, y=3$. 4m
Add: $3x=12$; $x=4, y=3$.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.

MODULE 16 / A7; review A1-A25

Functions and Mixed Algebra

WORKED ANSWERS | QUESTIONS 31-45

Marking guidance: B1 = correct answer; M1 = valid method; A1 = accurate final result. Equivalent simplified answers are accepted.

31 Answer: $5n+3$. 2m
 $5n+3$.

32 Answer: $y=4x-2$. 2m
 $y=4x-2$.

33 Answer: $x=-3,3$. 2m
 $x=-3,3$.

34 Answer: $x \leq 5$. 2m
 $x \leq 5$.

35 Answer: $32-3=29$. 2m
 $32-3=29$.

36 Answer: Original $2x-3$; new $2(x+5)-3=2x+7$, an increase of 10. 3m
Original $2x-3$; new $2(x+5)-3=2x+7$, an increase of 10.

37 Answer: $6x+2-x=5x+2$. 2m
 $6x+2-x=5x+2$.

38 Answer: $5n-2>100$; $n>20.4$, so $n=21$; term=103. 4m
 $5n-2>100$; $n>20.4$, so $n=21$; term=103.

39 Answer: $2x+1=-x+10$; $x=3, y=7$. 4m
 $2x+1=-x+10$; $x=3, y=7$.

40 Answer: $2x+2(x+3)=30$; $4x=24$; $x=6$; sides 6,9. 4m
 $2x+2(x+3)=30$; $4x=24$; $x=6$; sides 6,9.

41 Answer: 11. 1m
11.

42 Answer: $7a$. 1m
 $7a$.

43 Answer: $x=7$. 1m
 $x=7$.

44 Answer: 18. 1m
18.

45 Answer: 6. 1m
6.

Award method marks where the correct operation or set-up is shown. Check algebraic notation, exact values, graph labels and any required contextual conclusion.