

GCSE (9–1) MATHEMATICS

Notation and Substitution

Pearson Edexcel-style Topic Practice**Mixed Non-Calculator and Calculator Topic Practice**

Based on Pearson Edexcel GCSE Mathematics (1MA1)

Name _____

Date _____

Instructions

- Answer all questions.
- Write your answers in the spaces provided.
- You must show all your working.
- Section A: you must not use a calculator.
- Section B: you may use a calculator.

Information

- The marks for each question are shown in brackets.
- The questions suit both Foundation and Higher tier students.
- Diagrams are not drawn accurately unless the question says they are. Graphs drawn on a grid are accurate.
- The total mark for this paper is 47.

These are original practice questions written in the style of Pearson Edexcel GCSE Mathematics. They are not official Pearson examination questions.

Total marks

47

SECTION A

You must not use a calculator in this section.

1 Simplify

(a) $m \times m \times m$

Answer

(1)

(b) $4 \times p \times q$

Answer

(1)

(c) $c + c + c + c + c$

Answer

(1)

(d) $k \times 6 \times k$

Answer

(1)**(Total for Question 1 = 4 marks)****2 Here are five words.**

equation	expression	formula	identity	term
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Choose the correct word from the list to describe each of the following.

(a) $4n + 9 = 21$

Answer

(1)

(b) $3x^2 - 2y$

Answer

(1)

(c) $V = IR$

Answer

(1)

Question 2 continued

(d) $a + a + a + a \equiv 4a$

Answer

(1)

(Total for Question 2 = 4 marks)

3 Here is an expression.

$$6x^2 - x + 7$$

(a) Write down the coefficient of x .

Answer

(1)

(b) Write down the constant term.

Answer

(1)

(Total for Question 3 = 2 marks)

4 Kiran is k years old.

(a) Kiran's sister is 4 years younger than Kiran. Write an expression, in terms of k , for the age of Kiran's sister.

Answer years

(1)

(b) Kiran's mother is three times as old as Kiran. Write an expression, in terms of k , for the age of Kiran's mother.

Answer years

(1)

(c) Write an expression, in terms of k , for the age of Kiran's mother in 6 years' time.

Answer years

(1)

(Total for Question 4 = 3 marks)

5 Work out the value of

(a) $3x + 4y$ when $x = 6$ and $y = -5$

Answer

(2)

(b) $t^2 - 2t$ when $t = -3$

Answer

(2)

(Total for Question 5 = 4 marks)

6 Here is a number machine.



(a) The input is n . Write an expression, in terms of n , for the output.

Answer

(2)

(b) Gina says that the output is $3n + 5$. Explain why Gina is wrong.

(1)

(Total for Question 6 = 3 marks)

- 7 A company cleans carpets. It charges £30 for each visit, plus £12 for each room it cleans.
Write a formula for the total charge, C pounds, for cleaning r rooms in one visit.

Answer

(3)

(Total for Question 7 = 3 marks)

- 8 Ella is asked to work out the value of $2y^2$ when $y = -4$. Here is her working.

$$2y^2 = (2 \times -4)^2 = (-8)^2 = 64$$

- (a) Explain the mistake Ella has made.

.....
(1)

- (b) Work out the correct value of $2y^2$ when $y = -4$

Answer

(1)

- (c) Ben says that when $x = -6$, the value of $10 - x$ is 4. Is Ben correct? You must show how you get your answer.

.....
(1)

(Total for Question 8 = 3 marks)

- 9 Work out the value of

$$\frac{3x^2 - 4}{x + 5}$$

when $x = -2$

Answer

(3)

(Total for Question 9 = 3 marks)

- 10 Ravi says, "When x is negative, the value of $x^2 - x$ is always positive." Is Ravi correct? You must give a reason for your answer.

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(2)

(Total for Question 10 = 2 marks)

SECTION B

You may use a calculator in this section.

11 $s = ut + \frac{1}{2}at^2$

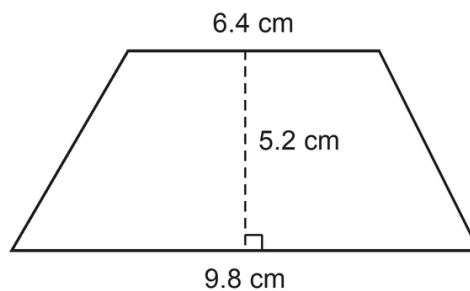
Work out the value of s when $u = 3.5$, $t = 4$ and $a = 9.8$

Answer

(2)

(Total for Question 11 = 2 marks)

12 The diagram shows a trapezium.



The area, A , of a trapezium is given by the formula

$$A = \frac{1}{2}(a + b)h$$

where a and b are the lengths of the parallel sides and h is the perpendicular height.

Work out the area of the trapezium. Give your answer correct to 1 decimal place.

Answer cm^2

(3)

(Total for Question 12 = 3 marks)

- 13** A phone contract costs £14.50 each month, plus 8p for each text sent.

(a) Write a formula for the total cost, C pounds, of one month when t texts are sent.

Answer

(3)

(b) In March, Ali sends 240 texts. Work out the total cost of Ali's contract for March.

Answer

(2)

(Total for Question 13 = 5 marks)

- 14** The time, T seconds, for one swing of a pendulum is given by the formula

$$T = 2\pi\sqrt{\frac{L}{g}}$$

where L is the length of the pendulum in metres and $g = 9.8$

A pendulum is 0.8 metres long. Work out the value of T for this pendulum. Give your answer correct to 3 significant figures.

Answer seconds

(2)

(Total for Question 14 = 2 marks)

- 15 The stopping distance, d metres, of a car travelling at v km/h is given by the formula

$$d = 0.2v + \frac{v^2}{150}$$

- (a) Work out the stopping distance of a car travelling at 48 km/h.

Answer metres

(2)

- (b) Rory says, "If the speed of the car doubles, the stopping distance doubles." Show that Rory is wrong.

.....
.....

(2)

(Total for Question 15 = 4 marks)

TOTAL FOR PAPER = 47 MARKS

Mark scheme

General marking guidance: M marks are method marks for a correct method or partial method. P marks are process marks for a correct process within a problem-solving question. A marks are accuracy marks, normally dependent on the relevant M or P mark. B marks are unconditional accuracy marks: no method is required. C marks are communication marks for a fully correct statement or conclusion with no contradiction or ambiguity. oe means "or equivalent", cao "correct answer only" and ft "follow through".

Question number	Answer	Additional guidance	Mark
1(a)	m^3	B1 cao Do not accept 3m	(1)
1(b)	4pq	B1 cao Accept 4qp	(1)
1(c)	5c	B1 cao Do not accept c5	(1)
1(d)	$6k^2$	B1 cao Do not accept $6 \times k^2$ or k^26	(1)

(Total for Question 1 = 4 marks)

Question number	Answer	Additional guidance	Mark
2(a)	equation	B1 cao	(1)
2(b)	expression	B1 cao	(1)
2(c)	formula	B1 cao	(1)
2(d)	identity	B1 cao	(1)

(Total for Question 2 = 4 marks)

Question number	Answer	Additional guidance	Mark
3(a)	-1	B1 cao Do not accept 1, 0 or x	(1)
3(b)	7	B1 cao Accept +7	(1)

(Total for Question 3 = 2 marks)

Question number	Answer	Additional guidance	Mark
4(a)	$k - 4$	B1 for $k - 4$ oe Do not accept $4 - k$	(1)

Question number	Answer	Additional guidance	Mark
4(b)	$3k$	B1 for $3k$ oe, e.g. $3 \times k$ Do not accept k^3 or $k + 3$	(1)
4(c)	$3k + 6$	B1 for $3k + 6$ oe ft their expression in $(b) + 6$ Do not accept $3(k + 6)$	(1)

(Total for Question 4 = 3 marks)

Question number	Answer	Additional guidance	Mark
5(a)	-2	M1 for $3 \times 6 + 4 \times (-5)$ or 18 and -20 seen A1 cao	(2)
5(b)	15	M1 for $(-3)^2 - 2 \times (-3)$ or 9 and 6 seen, or $9 + 6$ A1 cao	(2)

(Total for Question 5 = 4 marks)

Question number	Answer	Additional guidance	Mark
6(a)	$3(n + 5)$	B2 for $3(n + 5)$ oe, e.g. $(n + 5) \times 3$ or $3n + 15$ B1 for $n + 5$ seen Do not award B2 for $3n + 5$	(2)
6(b)	The machine adds 5 before it multiplies by 3, so the whole of $n + 5$ is multiplied by 3. Gina has only multiplied the n by 3. Accept a correct counter-example, e.g. "an input of 1 gives an output of 18, but $3 \times 1 + 5 = 8$ "	C1 for an explanation that refers to the order of the operations (the 5 is also multiplied by 3), or a correct counter-example Do not award C1 for "the answer should be $3(n + 5)$ " without a reason	(1)

(Total for Question 6 = 3 marks)

Question number	Answer	Additional guidance	Mark
7	$C = 12r + 30$	B3 for $C = 12r + 30$ oe B2 for $12r + 30$ oe (not a formula), or for a formula $C = 12r + k$ or $C = kr + 30$ with one wrong number k B1 for $12r$ seen, or for $C = 30r + 12$ Accept $C = 30 + 12r$ or $C = 12 \times r + 30$	(3)

(Total for Question 7 = 3 marks)

Question number	Answer	Additional guidance	Mark
8(a)	She has squared the 2 as well as the -4 . Only y is squared, so she should work out $(-4)^2 = 16$ first and then multiply by 2.	C1 for identifying that only y (or -4) should be squared, or that the 2 should not be squared Do not award C1 for "the answer should be 32" or "she should have got 32" without the reason	(1)
8(b)	32	B1 cao	(1)
8(c)	No. $10 - (-6) = 16$	C1 for "no" with $10 - (-6) = 16$ or $10 + 6 = 16$ shown Do not award C1 for "no" on its own	(1)

(Total for Question 8 = 3 marks)

Question number	Answer	Additional guidance	Mark
9	$\frac{8}{3}$ oe	M1 for $3 \times (-2)^2 - 4$ or $3 \times 4 - 4$ or 8 seen M1 for $-2 + 5$ or 3 seen as the denominator A1 for $\frac{8}{3}$ oe, e.g. $2\frac{2}{3}$ Accept 2.67 or better	(3)

(Total for Question 9 = 3 marks)

Question number	Answer	Additional guidance	Mark
10	Yes. When x is negative, x^2 is positive, and $-x$ is positive (subtracting a negative number is the same as adding a positive number). Two positive numbers add to give a positive number.	B1 for showing that x^2 is positive or that $-x$ is positive when x is negative, or for a correct substitution of a negative value showing a positive result, e.g. $(-2)^2 - (-2) = 6$ C1 for "yes" with a reason that covers both x^2 and $-x$ for every negative x Testing one or more values alone can score B1 but not C1	(2)

(Total for Question 10 = 2 marks)

Question number	Answer	Additional guidance	Mark
11	92.4	M1 for $3.5 \times 4 + \frac{1}{2} \times 9.8 \times 4^2$ or 14 and 78.4 seen A1 cao	(2)

(Total for Question 11 = 2 marks)

Question number	Answer	Additional guidance	Mark
12	42.1 cm ²	M1 for $\frac{1}{2} \times (6.4 + 9.8) \times 5.2$ oe A1 for 42.12 B1 ft for their answer correct to 1 decimal place Do not accept 42.12 for the B1 mark	(3)

(Total for Question 12 = 3 marks)

Question number	Answer	Additional guidance	Mark
13(a)	$C = 0.08t + 14.5$	B3 for $C = 0.08t + 14.5$ oe, e.g. $C = 14.50 + 0.08t$ B2 for $0.08t + 14.5$ oe (not a formula), or for a correct formula in pence, e.g. $C = 8t + 1450$ with C stated in pence B1 for $0.08t$ or $8t$ seen Do not award B3 for $C = 8t + 14.5$ (mixed units)	(3)
13(b)	£33.70	M1 for $0.08 \times 240 + 14.5$ oe or 19.2 seen A1 for 33.70 or 33.7 ft their formula in (a) for M1 only	(2)

(Total for Question 13 = 5 marks)

Question number	Answer	Additional guidance	Mark
14	1.80	M1 for $2 \times \pi \times \sqrt{(0.8 \div 9.8)}$ oe, or 0.2857... or 0.0816... seen A1 for 1.80 cao The answer must be given to 3 significant figures: 1.8 after otherwise correct working scores M1 only	(2)

(Total for Question 14 = 2 marks)

Question number	Answer	Additional guidance	Mark
15(a)	24.96 metres	M1 for $0.2 \times 48 + 48^2 \div 150$ oe, or 9.6 and 15.36 seen A1 for 24.96 or 25.0	(2)

Question number	Answer	Additional guidance	Mark
15(b)	At 96 km/h, $d = 0.2 \times 96 + 96^2 \div 150 = 19.2 + 61.44 = 80.64$. This is more than $2 \times 24.96 = 49.92$, so the stopping distance more than doubles. Accept any correct pair of speeds, e.g. $v = 30$ gives 12 and $v = 60$ gives 36, which is 3 times as far	M1 for working out d at a speed and at double that speed, e.g. $0.2 \times 96 + 96^2 \div 150$ C1 for a correct comparison showing the second distance is not double the first, e.g. 80.64 and 49.92 ft their answer to (a) for M1 only	(2)

(Total for Question 15 = 4 marks)