Calculator Model :	

Class	Full Name	Index Number

bowen
SECONDARY
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MID YEAR EXAMINATION 2016

O

4048/01

MATHEMATICS
Paper 1

Secondary 1 Express
10th May 2016

1 hour 15 mins

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES:

1. Write your name, index number and class in the spaces provided at the top of this page.

2. Answer **ALL** the questions on the paper provided.

3. Use an electronic calculator to evaluate explicit numerical expressions.

   If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures.

   Give answers in degrees to one decimal place. For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

4. **Essential workings** must be shown. Loss of essential workings and illegible handwriting will lead to loss of marks.

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1. Given the expression $x^2 + 4xy - x$, write down the

(a) the coefficient of x,

(b) the constant term

Answer: (a) _____ [1]

(b) _____ [1]

2. Consider the following six numbers

$$-1.23,\ \sqrt{2},\ 3,\ \pi,\ 1\frac{4}{7}.$$

(a) Which of the above number(s) is/are

(i) integer(s),

(ii) rational number(s),

(iii) irrational numbers (s).

Answer: (a)(i) _____ [1]

(ii) _____ [1]

(iii) _____ [1]

(b) Arrange the above numbers in descending order.

Answer: _____ [1]

3. Write the algebraic expression for each of the following statement.

(a) Add 15 to the product of h and m,

(b) Subtract $3k$ from the product of $2c$ and $3u$.

(c) Multiply the product of y and z by $19y$.

Answer: (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

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4. (a) Express 2160 as the product of its prime factors in index notation.

(b) Using your answer in part (a), find

(i) the largest 3-digit number that is a factor of 2160,

(ii) the smallest integer k such that $2160k$ is a perfect cube.

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Answer: (a) 2160 = _____ [1]

(b)(i) _____ [1]

(ii) _____ [2]

5. The following table records the maximum and minimum daily temperatures of a city on five consecutive days.

Day	Maximum temperature (°C)	Minimum temperature (°C)
Monday	-2	-15
Tuesday	8	-4
Wednesday	0	-2
Thursday	-3	-8
Friday	15	3

(a) Which day shows the greatest temperature difference?

(b) Which day shows the least temperature difference?

(c) Which day records the coldest temperature?

Answer: (a) _____ [1]

(b) _____ [1]

(c) _____ [1]

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6. Solve the following equations.

(a) $4a - 9 = 3(a + 4)$

(b) $\frac{t}{5} - \frac{t+2}{7} = 2$

(c) $\frac{7x-2}{2} = \frac{5x-3}{3}$

Answer: (a) a = _____ [2]

(b) t = _____ [2]

(c) x = _____ [2]

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7. (a) Simplify the expression $4(2y+3)-2(5y-6)$.

(b) Express $\frac{2x+1}{4}-\frac{x-3}{5}$ as a single fraction in the lowest term.

Answer: (a) _____ [2]

(b) _____ [2]

8. The prime factorisation of two numbers are

$$2^5 \times 5^{10} \times 11 \times 13^2 \text{ and } 2^3 \times 5 \times 11 \times 17^3.$$

(a) Find the
(i) HCF and,
(ii) LCM of these two numbers, expressing your answers in index notation.

(b) Find the smallest positive integer k such that $\sqrt{2^5 \times 5^{10} \times 11 \times 13^2 \times k}$ is a whole number.

Answer: (a) (i) _____ [1]

(ii) _____ [1]

(b) _____ [2]

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9. (a) Given that $p = -4$, evaluate $9p^2 - p$.

(b) Evaluate the following, without the use of calculator. Showing your workings clearly.

(i) $6 - 7 + 22 \times (5 - 2)^2$,

(ii) $(-2)^3 - 12 \div (2 - 8)$.

Answer: (a) _____ [2]

(b) (i) _____ [2]

(ii) _____ [2]

10. Roy bought 2 erasers at 49 cents each and 6 pens at \$1.95 each from the school bookshop. The shopkeeper asked for \$13.50. Without doing the actual calculation, use estimation to determine whether the charge of \$13.50 is reasonable.

Answer: _____ [3]

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11. (a) Factorise the following completely,

(i) $28ay - 7a$

(ii) $5(x-y)+9z(2x-2y)$.

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Answer: (a)(i) _____ [1]

(ii) _____ [2]

(b) Express the following, correct to two significant figures,

(i) 413.203,

(ii) 0.06056.

Answer: (b)(i) _____ [1]

(ii) _____ [1]

12. Evaluate the following, without the use of calculator, giving your answer in the simplest form.

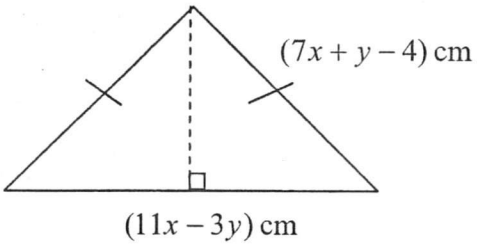
$$\left[-\frac{1}{4}-\left(-\frac{1}{6}\right)\right]\div\left[\frac{1}{3}+\left(-\frac{1}{2}\right)\right]$$

Answer: _____ [3]

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13. The following diagram shows the sides of the isosceles triangle.

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(a) Express the perimeter of the triangle in terms of x and y, in the simplest form.

Answer: (a) _____ cm [2]

(b) If $x = 2.4$ and $y = 1.2$, find the perimeter of the triangle.

Answer: (b) _____ cm [1]

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MID YEAR EXAMINATION 2016

Marking Scheme

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1. Given the expression $x^2 + 4xy - x$, write down the

(a) the coefficient of x,

(b) the constant term

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Answer: (a) -1 [1]

(b) 0 [1]

2. Consider the following six numbers

$$-1.23,\ \sqrt{2},\ 3,\ \pi,\ 1\frac{4}{7}.$$

(a) Which of the above number(s) is/are

(i) integer(s),

(ii) rational number(s),

(iii) irrational numbers (s).

Answer: (a)(i) 3 [1]

(ii) $-1.23, 3, 1\frac{4}{7}$ [1]

(iii) $\sqrt{2}, \pi$ [1]

(b) Arrange the above numbers in descending order.

Answer: $\pi, 3, 1\frac{4}{7}, \sqrt{2}, -1.23$ [1]

3. Write the algebraic expression for each of the following statement.

(a) Add 15 to the product of h and m,

(b) Subtract $3k$ from the product of $2c$ and $3u$.

(c) Multiply the product of y and z by $19y$.

Answer: (a) $hm + 15$ [1]

(b) $6cu - 3k$ [1]

(c) $19y^2z$ [1]

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4. (a) Express 2160 as the product of its prime factors in index notation.

(b) Using your answer in part (a), find

(i) the ~~smallest~~ largest 3-digit number that is a factor of 2160,

(ii) the ~~smallest~~ smallest integer k such that $2160k$ is a perfect cube.

(a)

2	2160
2	1080
2	540
2	270
3	135
3	45
3	15
5	5
	1

(b)(i) $2160 \div 2 = 1080$

$2160 \div 3 = 720$

(b)(ii) $2160k = 2^6 \times 3^3 \times 5^3$

$= 2^4 \times 2^2 \times 3^3 \times 5 \times 5^2$ — M1

$\therefore k = 2^2 \times 5^2$

$= 4 \times 25$

$= 100$ — A1

Answer: (a) $2160 = 2^4 \times 3^3 \times 5$ [1]

(b)(i) 720 [1]

(ii) 100 [2]

5. The following table records the maximum and minimum daily temperatures of a city on five consecutive days.

Day	Maximum temperature (°C)	Minimum temperature (°C)	temp diff
Monday	-2	-15	13
Tuesday	8	-4	12
Wednesday	0	-2	2
Thursday	-3	-8	5
Friday	15	3	12

(a) Which day shows the greatest temperature difference?

(b) Which day shows the least temperature difference?

(c) Which day records the coldest temperature?

(a) Temperature diff :

Mon — 13

Tue — 12

Wed — 2

Thur — 5

Fri — 12

Answer: (a) Monday [1]

(b) Wednesday [1]

(c) Monday [1]

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6. Solve the following equations.

(a) $\frac{7x-2}{2} = \frac{5x-3}{3}$

(b) $\frac{t}{5} - \frac{t+2}{7} = 2$

(a) $4a - 9 = 3(a+4)$

(a) $\frac{7x-2}{2} = \frac{5x-3}{3}$

$3(7x-2) = 2(5x-3)$

$21x - 6 = 10x - 6$ — M1

$21x - 10x = -6 + 6$

$11x = 0$

$x = 0$ — A1

(b) $\frac{7t - 5(t+2)}{35} = 2$

$7t - 5t - 10 = 70$ — M1

$2t = 70 + 10$

$2t = 80$

$t = 40$ — A1

(a) $4a - 9 = 3a + 12$ — M1

$4a - 3a = 12 + 9$

$a = 21$ — A1

Answer: (a) $x =$ 0 [2]

(b) $t =$ 40 [2]

(a) a = 21 [2]

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7. (a) Simplify the expression $4(2y+3)-2(5y-6)$.

(b) Express $\frac{2x+1}{4}-\frac{x-3}{5}$ as a single fraction in the lowest term.

(a) $4(2y+3)-2(5y-6)$

$= 8y+12-10y+12$ — M1

$= -2y+24$ — A1

(b) $\frac{2x+1}{4}-\frac{x-3}{5} = \frac{5(2x+1)-4(x-3)}{20}$ — M1

$= \frac{10x+5-4x+12}{20}$

$= \frac{6x+17}{20}$ — A1

Answer: (a) $-2y+24$ [2]

(b) $\frac{6x+17}{20}$ [2]

8. The prime factorisation of two numbers are

$$2^5 \times 5^{10} \times 11 \times 13^2 \text{ and } 2^3 \times 5 \times 11 \times 17^3.$$

(a) Find the
(i) HCF and,
(ii) LCM of these two numbers, expressing your answers in index notation.

(b) Find the smallest positive integer k such that $\sqrt{2^5 \times 5^{10} \times 11 \times 13^2 \times k}$ is a whole number.

$\sqrt{2^5 \times 5^{10} \times 11 \times 13^2 \times k} = 2^6 \times 5^{10} \times 11^2 \times 13^2$

$= 2^5 \times 2 \times 5^{10} \times 11 \times 11 \times 13^2$

$\therefore k = 2 \times 11$ — M1

$= 22$ — A1

Answer: (a)(i) $2^3 \times 5 \times 11$ [1]

(ii) $2^5 \times 5^{10} \times 11 \times 13^2 \times 17^3$ [1]

(b) 22 [2]

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9. (a) Given that $p = -4$, evaluate $9p^2 - p$.

(b) Evaluate the following, without the use of calculator. Showing your workings clearly.

(i) $6 - 7 + 22 \times (5-2)^2$,

(ii) $(-2)^3 - 12 \div (2-8)$.

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(a) $9p^2 - p = 9(-4)^2 - (-4)$ —M1

$= 9(16) + 4$

$= 148$ —A1

(b)(i) $6 - 7 + 22 \times (5-2)^2$

$= 6 - 7 + 22 \times 3^2$

$= 6 - 7 + 22 \times 9$ —M1

$= 6 - 7 + 198$

$= 197$ —A1

(ii) $(-2)^3 - 12 \div (2-8)$

$= -8 - 12 \div (-6)$ —M1

$= -8 + 2$

$= -6$ —A1

Answer: (a) 148 [2]

(b) (i) 197 [2]

(ii) −6 [2]

10. Roy bought 2 erasers at 49 cents each and 6 pens at \$1.95 each from the school bookshop. The shopkeeper asked for \$13.50. Without doing the actual calculation, use estimation to determine whether the charge of \$13.50 is reasonable.

cost of items $= (2 \times 0.49) + (6 \times 1.95)$

$\approx (2 \times 0.5) + (6 \times 2)$ —M1

$= 1 + 12$

$= 13$ —M1

Answer: The charge is Not reasonable as the shopkeeper overcharge —A1 (must write statement) [3]

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11. (a) Factorise the following completely,

(i) $28ay - 7a$

(ii) $5(x-y)+9z(2x-2y)$.

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(a)(i) $28ay - 7a = 7a(4y-1)$ B1

(ii) $5(x-y)+9z(2x-2y)$

$= 5(x-y) + 18z(x-y)$ — M1

$= (5+18z)(x-y)$ — A1

Answer: (a)(i) $7a(4y-1)$ [1]

(ii) $(5+18z)(x-y)$ [2]

(b) Express the following, correct to two significant figures,

(i) 413.203,

(ii) 0.06056.

Answer: (b)(i) 4.10 [1]

(ii) 0.061 [1]

12. Evaluate the following, without the use of calculator, giving your answer in the simplest form.

$$\left[-\frac{1}{4}-\left(-\frac{1}{6}\right)\right]\div\left[\frac{1}{3}+\left(-\frac{1}{2}\right)\right]$$

$= \left(-\frac{1}{4}+\frac{1}{6}\right)\div\left(\frac{1}{3}-\frac{1}{2}\right)$ — M1

$= \left(-\frac{3+2}{12}\right)\div\left(\frac{2-3}{6}\right)$

$= \frac{-1}{12}\div\left(\frac{-1}{6}\right)$

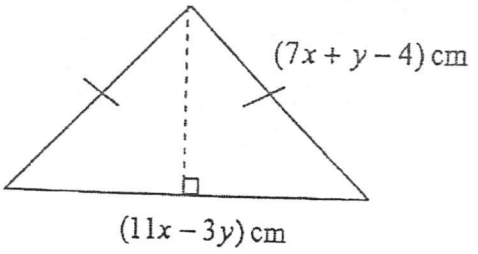
$= -\frac{1}{12}\times\left(\frac{6}{1}\right)$ — M1

$= \frac{1}{2}$ — A1

Answer: $\frac{1}{2}$ [3]

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13. The following diagram shows the sides of the isosceles triangle.



(a) Express the perimeter of the triangle in terms of x and y, in the simplest form.

perimeter = $2(7x+y-4) + (11x-3y)$ — M1

$= 14x+2y-8+11x-3y$

$= (25x-y-8)$ cm — A1

Answer: (a) $25x-y-8$ cm [2]

(b) If $x = 2.4$ and $y = 1.2$, find the perimeter of the triangle.

perimeter = $25x-y-8$

$= 25(2.4)-1.2-8$

$= 50.8$ cm

Answer: (b) 50.8 cm [1]

----- END OF PAPER -----

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Answer **all** the questions.

1. (a) Arrange the following numbers in ascending order.

$$1.63^2,\ 2.6,\ 2\frac{2}{3}$$ [1]

(b) A list of numbers are shown below.

$$3,\ -4,\ \sqrt{4},\ \sqrt[3]{20},\ 4$$

From the list above, state

(i) an irrational number, [1]
(ii) a prime number, [1]
(iii) a perfect square. [1]

---

2. (a) Evaluate $\frac{5.3^2 - 9.493}{5.03565 + 3}$, giving your answer correct to

(i) 3 decimal places, [1]
(ii) 3 significant figures, [1]
(iii) the nearest integer. [1]

(b) Estimate $\frac{5.3^2 - 9.493}{5.03565 + 3}$ by rounding off each number correct to 1 significant figure. [2]

---

3. Factorize the following expressions.

(a) $3x + 9xy$, [1]

(b) $x(3y-5)+2(3y-5)$. [1]

---

4. Simplify the following expressions.

(a) $-6xy \times 3y + 9xy^2$, [2]

(b) $-x+2y+1-(-3x+4y-2)$, [2]

(c) $3(-x+6)+2(5x+4y)$, [2]

(d) $\frac{2(3x-y)}{9} - \frac{3-y}{2}$. [3]

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5. Solve the following.

(a) $2x-(4-3x)=3x+6$, [3]

(b) $\frac{5+2x}{2}=\frac{8x-5}{3}$. [3]

6. Find the highest common factor of 72, 216 and 324. [2]

7. Evaluate the following without the use of calculator.

(a) $\{-5-[9+(-4)]^2\}\times(-3)$, [2]

(b) $16-[(10-22)\div 0.1]$, [2]

(c) $1\frac{1}{3}\div\left(3\frac{1}{2}-\frac{2}{3}\right)$. [3]

8. Given that $x=4$, $y=-4$ and $z=2$, find the value of $\frac{\sqrt{x}-y^2}{z}$. [2]

9. A lock can only be opened by using a 3-digit number. Joseph set his 3-digit number to be the largest multiple of 31 less than 1000. Find, with working, this number. [2]

10. (a) The length and breadth of a rectangular field are 105 metres and 68 metres respectively, corrected to the nearest metre. Identify the smallest possible value of the

(i) length, [1]
(ii) breadth. [1]

(b) Calculate the smallest possible area of the rectangular field. [1]

(c) It is measured that the length of the rectangular field is 105.4 metres. Determine, with supporting working, if the area of the field can be 7110 m^2. [2]

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11. A girl is 32 years younger than her mother and she is x years old now.

(a) Express her mother's present age in terms of x. [1]

(b) Express the sum of their ages in 3 years' time in terms of x, leaving your answer in the simplest form. [2]

(c) In 3 years' time, the sum of their ages will be 62. Form an equation in x and solve it. [2]

(d) Hence, find the mother's present age. [1]

End of paper

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Answer key

1a	$2.6,\ 1.63^2,\ 2\frac{2}{3}$	8	-7
1b	(i) $\sqrt[3]{20}$	9	992
1b	(ii) 3 or $\sqrt{4}$	10a	(i) 104.5 m
1b	(iii) 4	10a	(ii) 67.5 m
2a	(i) 2.314	10b	7053.75 m^2
2a	(ii) 2.31	10c	Cannot
2a	(iii) 2	11a	$(x+32)$ years old
2b	2	11b	$2x+38$
3a	$3x(1+3y)$	11c	$x=12$
3b	$(3y-5)(x+2)$	11d	44 years old
4a	$-9xy^2$		
4b	$2x-2y+3$		
4c	$7x+8y+18$		
4d	$\frac{12x+5y-27}{18}$		
5a	$x=5$		
5b	$x=2\frac{1}{2}$		
6	36		
7a	90		
7b	136		
7c	$\frac{8}{17}$		

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