



**SYDNEY BOYS HIGH SCHOOL**  
MOORE PARK, SURRY HILLS

Year 7

Half Yearly Examination 2013

# Mathematics

## General Instructions

- Working time – 60 minutes.
- Write using black or blue pen.
- Pencil may be used for diagrams.
- Do not use Liquid paper or tape.
- **NON – CALCULATOR EXAM.**
- All *necessary* working **MUST** be shown in every question if full marks are to be awarded.
- Marks may **NOT** be awarded for untidy or badly arranged work.
- If more space is required, clearly write the number of the QUESTION on one of the back pages and answer it there. Indicate that you have done so.
- Clearly indicate your class by placing an X, next to your class.

Examiner: P. Bigelow

NAME:

Class	Teacher	
7MaE	Ms. Nesbitt / Ms. Evans	
7MaF	Mr. Boros	
7MaM	Ms. Chen / Mr. Elliot	
7MaR	Mr. McQuillan	
7MaS	Ms. Ward / Mr. McQuillan	
7MaT	Mr. Hespe	

Section	Mark	
A		/10
B		/12
C		/12
D		/10
E		/11
F		/10
Total		/65

## Section A (10 Marks)

1. True or False?

a)  $-4 < -3$

b)  $|-17| \geq |-14|$

2.  $\sqrt{0.25} =$

3. Write  $4 \times 10^3 + 6 \times 10^2 + 7 \times 1$  as a basic numeral.

4. Evaluate:-  $3 - 6 \times 7 - 5$

5. Write 1949 using Roman numerals.

6. What is the place value of 4 in 347 521?

7. What is the product of 27 and 46?

8.  $0.4 \div 0.01 =$

9. Convert 0.016 to a fraction in simplest form.

End of Section A.

~ 3 ~

**Section B (12 Marks)**

1. Plot the following points on a number lattice.  $A(4, -1)$ ,  $B(-2, -3)$  and  $C(-3, 0)$ .

2. Plot the set of single digit prime numbers on a number line.

3. Give an example in words of:-

a) an empty set.

b) an infinite set.

4. List all the subsets of  $\{p, q, r\}$

~ 4 ~

5. What is the remainder when 916 is divided by 23?

6. Write down the H.C.F. of 48 and 120.

**End of Section B.**

**Section C (12 Marks)**

1. List the set of composite numbers between 71 and 79.

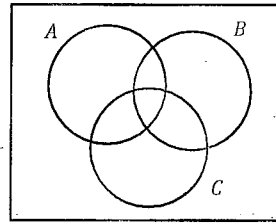
2. What is the L.C.M. of 7,9 and 12?

3. Write 421 using Egyptian characters.

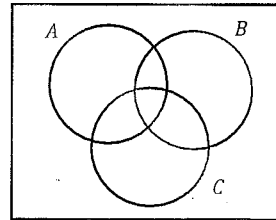
4. Convert  $\frac{5}{16}$  to a decimal.

5. Use the Venn diagrams to indicate

a)  $(A \cup B) \cap C$



b)  $A \cap (\widetilde{B \cup C})$



End of Section C.

Section D (10 Marks)

1. Between which two consecutive integers does  $\sqrt{172}$  lie?

2. Find the value of  $|4 - 7| - |-6 + 4|$

3. The average of three numbers is 28. If two of the numbers are 16 and 19, what is the third number?

4. Given the following sets: (E is the universal set)

$$E = \{1, 2, 3, \dots, 20\}$$

$$A = \{5, 7, 11, 15\}$$

$$B = \{2, 10, 11, 15, 19\}$$

List:

a)  $A \cap B$

b)  $A \cup B$

c)  $\overline{A \cup B}$

5. From the set  $\{61, 111, 59, 1441\}$  write down the subset of primes.

**Section E (11 Marks)**

1. Find:

a)  $\sqrt{4671}$  (correct to 1 decimal place).

b)  $\sqrt{7.37}$  (correct to 2 decimal places).

2. If  $n = 47$ ,  $n(A) = 20$  and  $n(A \cap B) = 11$ .

Find  $n(B)$ .

End of Section D.

3. Find  $(3.1 - 1.9)^2 \times 0.5$

4. How many numbers from 10 to 99, have the sum of their digits equal to 9?

**End of Section E.**

**Section F (10 Marks)**

1. a) Express 540 as a product of prime factors (use index notation).

b) How many distinct factors of 540 exist (show working/reasons)?

2. At a meeting 15 hand shakes were exchanged. Each person shook hand with each of the others. How many people were present?

3. I have one of each of a 5 cent, 10 cent, 20 cent and 50 cent coin. What is the total number of non-zero amounts of money which can be formed from some or all of these coins?

4. In how many ways may a row of four "on - off" switches be set if no two adjacent switches may be off?

Use this space if you wish to rewrite any answers.

Clearly *indicate* the **Question** number.

5. How many times in one day do the hands of a clock form a right - angle?

**End of Section F.**

**End of Paper**

Extra working pages



**Section A (10 Marks)**

1. True or False?

a)  $-4 < -3$

T

b)  $|-17| \geq |-14|$

F

2.  $\sqrt{0.25} =$

0.5

3. Write  $4 \times 10^3 + 6 \times 10^2 + 7 \times 1$  as a basic numeral.

4607

Evaluate:-  $3 - 6 \times 7 - 5$

-44

~ 2 ~

5. Write 1949 using Roman numerals.

MCMXLIX

6. What is the place value of 4 in 347 521?

10 000, 40 000

7. What is the product of 27 and 46?

1242

8.  $0.4 \div 0.01 =$

40

9. Convert 0.016 to a fraction in simplest form.

$\frac{2}{125}$

End of Section A.

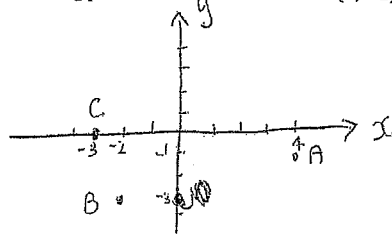
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2013 Year 7 H.Y.

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**Section B (12 Marks)**

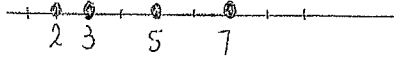
1. Plot the following points on a number lattice.  $A(4, -1)$ ,  $B(-2, -3)$  and  $C(-3, 0)$ .



(3)

2. Plot the set of single digit prime numbers on a number line.

{2, 3, 5, 7}



(2)

3. Give an example in words of:-

a) an empty set.

{a female student in your maths class}

(1)

b) an infinite set.

{even numbers}  
or {integers}  
or {odd numbers}

(1)

4. List all the subsets of  $\{p, q, r\}$

$\{p\}$ ,  $\{q\}$ ,  $\{r\}$ ,  $\{p, q\}$ ,  $\{p, r\}$ ,  $\{q, r\}$   
 $\{p, q, r\}$ ,  $\emptyset$

(2)

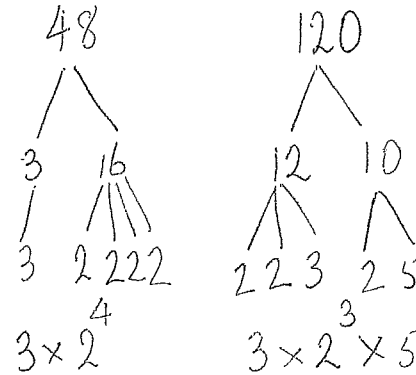
5. What is the remainder when 916 is divided by 23?

$$\begin{array}{r} 39 \frac{19}{23} \\ 23 \overline{) 916} \end{array}$$

remainder is 19

(1)

6. Write down the H.C.F. of 48 and 120.



$$\text{HCF} = 3 \times 2^3 \text{ or } 24$$

(2)

End of Section B.

**Section C (12 Marks)**

1. List the set of composite numbers between 71 and 79.

$\{72, 74, 75, 76, 77, 78\}$

(3)

2. What is the L.C.M. of 7, 9 and 12?

$7$   
 $9 = 3^2$

$LCM = 7 \times 3^2 \times 2^2 = \boxed{252}$

$12 = 2^2 \times 3$

(2)

3. Write 421 using Egyptian characters.

⊙ ⊙ ⊙ ⊙ ∩ ∩ |

(1)

4. Convert  $\frac{5}{16}$  to a decimal.

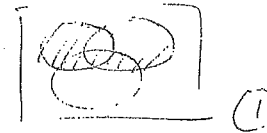
$16 \overline{) 0.3125}$   
 $5.0^20^40^80$

$\boxed{0.3125}$

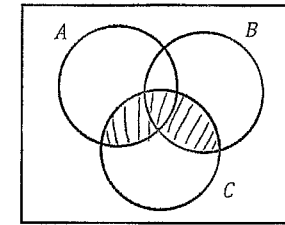
(2)

5. Use the Venn diagrams to indicate

a)  $(A \cup B) \cap C$

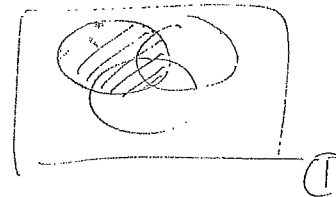


(1)

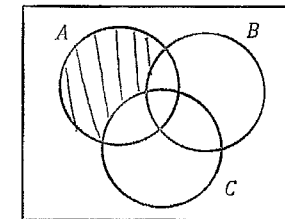


(2)

b)  $A \cap (\overline{B \cup C})$



(1)



(2)

End of Section C.

~~5/16/10/2/7~~

**Section D (10 Marks)**

1. Between which two consecutive integers does  $\sqrt{172}$  lie?

13 and 14

2. Find the value of  $|4 - 7| - |-6 + 4|$

$$3 - 2 = 1$$

3. The average of three numbers is 28. If two of the numbers are 16 and 19, what is the third number?

$$\frac{n_1 + n_2 + n_3}{3} = 28$$

$$16 + 19 + n_3 = 84$$

$$n_3 = 49$$

4. Given the following sets: (E is the universal set)

$$E = \{1, 2, 3, \dots, 20\}$$

$$A = \{5, 7, 11, 15\}$$

$$B = \{2, 10, 11, 15, 19\}$$

List:

$$a) A \cap B = \{11, 15\}$$

$$b) A \cup B = \{2, 5, 7, 10, 11, 15, 19\}$$

$$c) \overline{A \cup B} = \{1, 3, 4, 6, 8, 9, 12, 13, 14, 16, 17, 18, 20\}$$

5. From the set  $\{61, 111, 59, 1441\}$  write down the subset of primes.

$$\{61, 59\}$$

End of Section D.

Section E (11 Marks)

1. Find:

68.34

a)  $\sqrt{4671}$  (correct to 1 decimal place).

$$\begin{array}{r} 36 \\ 1071 \end{array}$$

$12 \square \times \square \leq 1071$ .

$128 \times 8 = 1024$

$$\begin{array}{r} 4700 \\ 4089 \end{array}$$

$136 \square \times \square < 4700$ . 61100

$1363 \times 3 = 4089$ .

$1366 \square \times \square < 61100$ .

b)  $\sqrt{7.37}$  (correct to 2 decimal places).

2.714

$4 \square \times \square < 337$ .

$47 \times 7 = 329$ .

$$\begin{array}{r} 07.37 \\ 04 \\ 337 \\ 329 \end{array}$$

$54 \square \times \square \leq 800$

$542 \square \times \square \leq 900$ . 25900

$n(A \cup B) = 47$ .

2. If  $n = 47$ ,  $n(A) = 20$  and  $n(A \cap B) = 11$ .

Find  $n(B)$ .

20

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$47 = 20 + n(B) - 11$

$58 = 20 + n(B)$

$38 = n(B)$

Not to next d.p

①  
②

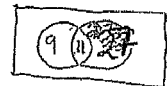
68.3

③

2.71

③

②



3. Find  $(3.1 - 1.9)^2 \times 0.5$

$(1.2)^2 \times 0.5$  → ①

$1.44 \times 0.5$  →

0.72 → ①

①

4. How many numbers from 10 to 99, have the sum of their digits equal to 9?

1, 8.

2, 7

3, 6

4, 5.

5, 4.

6, 3

7, 2.

8, 1

9, 0

MUST PUT 9  
⑨

②

End of Section E.

**Section F (10 Marks)**

1. a) Express 540 as a product of prime factors (use index notation).

$$\begin{array}{r} 5 \overline{) 540} \\ \underline{3 \phantom{0}} \\ 3 \overline{) 108} \\ \underline{3 \phantom{0}} \\ 3 \overline{) 36} \\ \underline{3 \phantom{0}} \\ 2 \overline{) 12} \\ \underline{2 \phantom{0}} \\ 2 \end{array}$$

$$540 = 2^2 \times 3^3 \times 5$$

- b) How many distinct factors of 540 exist (show working/reasons)?

$$1, 540, 2, 270, 3, 180, 4, 135, 5, 108, 6, 90, 9, 60, 10, 54, 12, 45, 15, 36, 18, 30, 20, 27 \quad \therefore 24$$

2. At a meeting 15 hand shakes were exchanged. Each person shook hand with each of the others. How many people were present?

Order of arrival	1	2	3	4	5	6
Number of shakes	0	1	2	3	4	5
Total handshakes	0	1	3	6	10	15

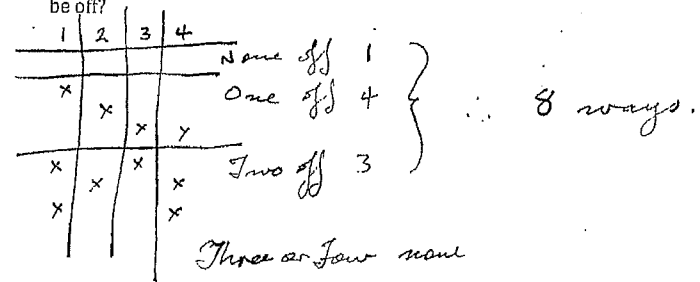
$\therefore 6$  people.

3. I have one of each of a 5 cent, 10 cent, 20 cent and 50 cent coin. What is the total number of non-zero amounts of money which can be formed from some or all of these coins?



$$\begin{array}{l} \text{Total singles} = 4 \\ \text{" pairs} = 6 \\ \text{" triples} = 4 \\ \text{" fours} = 1 \\ \hline 15 \text{ amounts} \end{array}$$

4. In how many ways may a row of four "on - off" switches be set if no two adjacent switches may be off?



5. How many times in one day do the hands of a clock form a right - angle?

In one minute, minute hand moves  $\frac{360^\circ}{60} = 6^\circ$

hour hand moves  $\frac{6^\circ}{12} = \frac{1}{2}^\circ$

$\therefore$  Difference grows by  $5\frac{1}{2}^\circ$  per minute.

At 3am the hands are at  $90^\circ$  and set every  $180^\circ$

of difference afterwards.

$$180 \div \frac{11}{2} = 180 \times \frac{2}{11}$$

$$= \frac{360}{11} \text{ minutes between every } 90^\circ \text{ gap.}$$

$$24 \text{ hours} = 1440 \text{ minutes}$$

$$1440 \div \frac{360}{11} = 1440 \times \frac{11}{360}$$

$$= 44.$$

$\therefore 44$  times in one day.

End of Section F.

End of Paper