Candidate Name _____

Class	Reg Number

TANJONG KATONG SECONDARY SCHOOL
2010 YEAR END EXAMINATIONS
SECONDARY ONE

MATHEMATICS
PAPER 2

Friday **8 Oct 2010** **1 hour 15 minutes**
0750 – 0905

READ THESE INSTRUCTIONS FIRST

Write your name, class and register number on the cover page.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.
All answers are to be written on the writing paper provided.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
You are expected to use a scientific 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.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

This question paper consists of 5 printed pages.

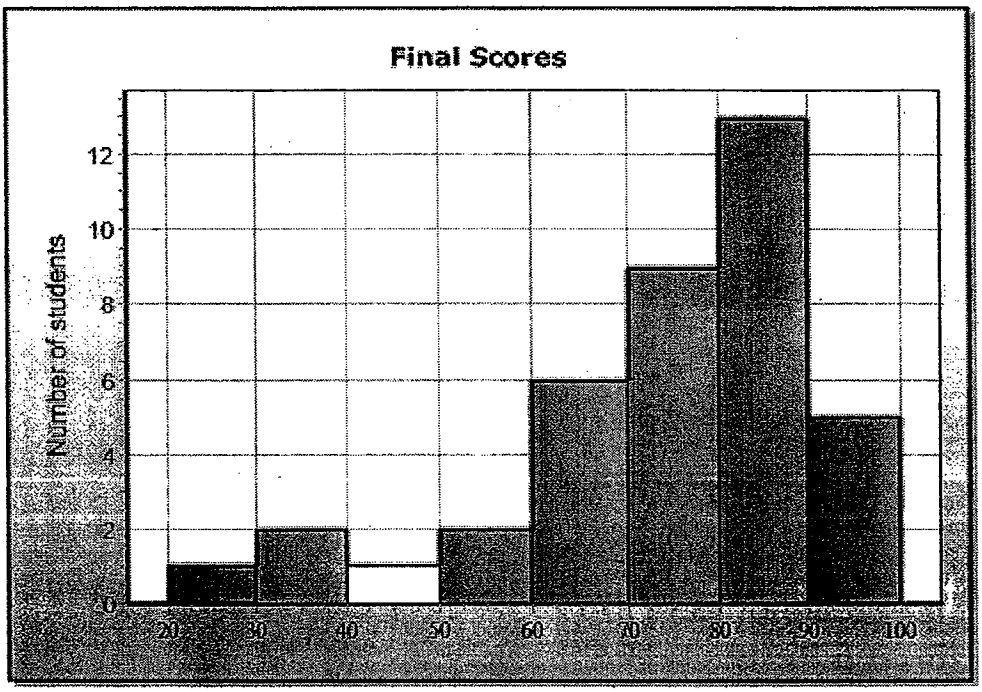
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Answer **all** questions

1 Given that $\frac{4x-3y}{7}=\frac{x}{3}$, find the ratio $y : x$. [2]

2 The histogram shows the final scores, x, of a class in a Mathematics examination.
It is interpreted that 2 students scored at least 30 marks and less than 40 marks.



(a) Write down the class width of each class. [1]

(b) How many students are there in the class? [1]

(c) What percentage of students scored at least 40 marks but less than 80 marks? [2]

3 A universal set ε and its sets P and Q are given by

$\varepsilon = \{ x: x \text{ is a natural number } \leq 15 \}$

$P = \{ x: x \text{ is the HCF of } 24, 36 \}$

$Q = \{ x: x \text{ is a multiple of } 3 \}$

(a) List down the elements of sets P and Q. [2]

(b) The elements of another set $R = \{ 1, 2, 3, 4, 6, 12 \}$.
Describe the set R. [1]

(c) Given that T is also a set in the universal set such that [1]
$T = \{ x: x \text{ is the LCM of } 24, 36 \}$, find $n(T)$.

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4 The interior angles of a hexagon are $(114+x)°$, $147°$, $(102+2x)°$, $4x°$, $(154-3x)°$ and $67°$. Find

(a) the value of x, [3]

(b) the size of the smallest exterior angle of the hexagon. [2]

5 The scale of a street map A is $\frac{1}{50000}$. Find

(a) the actual distance, in km, of an airport runway represented by a distance of 7.8 cm on map A. [1]

(b) the length of the same runway, in cm, when drawn on map B with a scale of $\frac{1}{20000}$. [2]

(c) the actual area, in km^2, of a runway which has an area of 15 cm^2 on map A. [2]

6 (a) Solve the inequality $-2+5x \geq -13$. [2]

(b) Find the smallest integer that satisfies the inequality in (a). [1]

(c) Solve the inequality $1-2k \leq -5 < 6-\frac{5k}{3}$ and represent your solution on a number line. [3]

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7 The diagram shows a sequence of figures formed by black and white squares

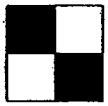


Fig. 1

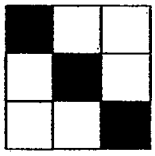


Fig. 2

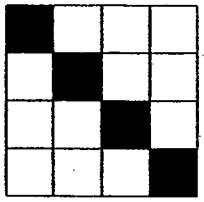


Fig. 3

Figure	n	**1**	**2**	**3**	**4**	**5**
No. of black squares	B_n	2	3	4	5	6
No. of white squares	W_n	2	6	12	a	b
Total number of squares	T_n	4	9	16	c	d

(a) State the unknown values of a, b, c and d. [2]

(b) Write down an equation linking T_n, W_n and B_n. [1]

(c) Find the general term for W_n. [1]

(d) Hence or otherwise, find the number of white squares in figure 73. [1]

(e) Explain clearly if it is possible to have 1539 white squares in any figure. [1]

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8 On the piece of plain paper provided, construct and label the quadrilateral $PQRS$ given that $PQ = 10.3$ cm, $PS = 5.7$ cm, $\angle PQR = 67°$, $QS = 9.5$ cm and diagonal $PR = 10.5$ cm. [3]

(a) Measure the length of RS, [1]

(b) On the same diagram, construct

(i) the angle bisector of $\angle QPS$, [2]

(ii) the perpendicular bisector of SR. [2]

(c) Draw a line parallel to PQ passing through S. [1]

9 C and D are two towns which are 8.76 km apart. At 06 30, Leonard starts his jog from town C towards D at an average speed of 3 m/s. At 06 40, Johnny departs from town D towards C jogging at a constant speed of y km/h. Leonard meets Johnny at 07 00.

(a) What was the distance (in km) Leonard covered before he met Johnny? [2]

(b) (i) Form an equation in terms of y and solve it. [2]

(ii) Hence or otherwise, find Johnny's jogging speed in m/s. [2]

(c) Leonard had a tummy ache and spent 10 minutes in a public toilet at the point where he met Johnny. He then continued on his journey towards town D at an average speed of 11.2km/h. What time did Leonard reach town D? [3]

End of Paper

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SOLUTIONS

Q1 $y : x = 5 : 9$

Q2 a 10 marks

b 39

c 46.2%

Q3 a $P = \{12\}$

$Q = \{3,6,9,12,15\}$

b $R = \{x : x \text{ is a factor of } 12\}$

R is a set containing factors of 12

c n(T) = 0

Q4 a x = 34

b 10°

Q5 a 3.9 km

b 19.5 cm

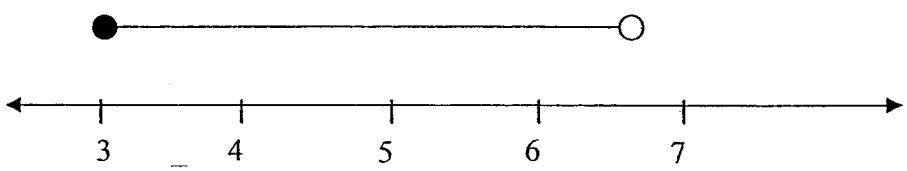
c 3.75 km^2

Q6 a $x \geq -2\frac{1}{5} or -2.2$

b $x = -2$

c

$$3 \leq k < 6\frac{3}{5}$$



Q7 a a = 20, b = 30, c = 25, d = 36

b $T_n = W_n + B_n$

c $W_n = n(n+1)$

d 5402

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e The number of white squares is always even

Q8 a RS = 5.3cm (±0.1*cm*)

Q9 a 5.4 km

bi y = 10.8 km/h

bii 2.8m/s

c 7.28 am

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For Examiner's Use

Answer ALL questions. ALL diagrams in this paper are not drawn to scale.

For Examiner's Use

1. Consider the following numbers:

$$\sqrt{2},\quad \frac{18}{5},\quad \sqrt{64},\quad -\frac{9}{3},\quad 0.7\dot{8},\quad 0$$

Write down the

(a) integers

Answer

(a) _____ [1]

(b) irrational numbers

Answer

(b) _____ [1]

---

2. Arrange the numbers $0.\dot{8}\dot{3}$, $0.8\dot{3}$, $\frac{4}{5}$, 0.83, 0.835 in ascending order.

Answer

_____ [2]

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3. An object moves 7.2 km in 1 hour. Find its average speed in
(a) m/s.

Answer

(a) _____ m/s [1]

(b) cm/s.

Answer

(b) _____ cm/s [2]

---

4. Given that $C = F^2 + \frac{1}{2}pn$, find the value of n when $F = 5$, $p = 0.4$, and $C = 65$.

Answer

_____ [2]

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5. Subtract the sum of $3ab + a - 2b$ and $5a - 4b + ba$ from $10 - 7ab$.

Answer _____ [2]

---

6. **(a)** If one fifth of 2520 is the same as $2^x \times 3^y \times 7^z$, what are the values of x, y and z?

Answer

(a) _____ [3]

(b) Hence or otherwise, find the smallest value of k where $2^x \times 3^y \times 7^z \times k$ is a perfect cube.

Answer

(b) _____ [1]

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7. Simplify

(a) $-3a(2-b)+2\left(-a+\frac{1}{2}ab\right)$,

Answer

(a) _____ [2]

(b) $\frac{3g+4h}{8}-\frac{7g-2h}{3}$.

Answer

(b) _____ [3]

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8. Factorize completely

(a) $-7rs-28st$,

Answer

(a) _____ [1]

(b) $9gh+45h-15-3g$.

Answer

(b) _____ [3]

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9. On a particular week, a bookshop sold pens, pencils and notebooks is in the ratio $2 : 4 : x$.

(a) If the data was represented on a pie chart, the angle of the sector representing the sales of notebooks is 120°. Find the value of x.

Answer

(a) _____ [2]

(b) Given that the number of pens sold is 150, find the number of notebooks sold.

Answer

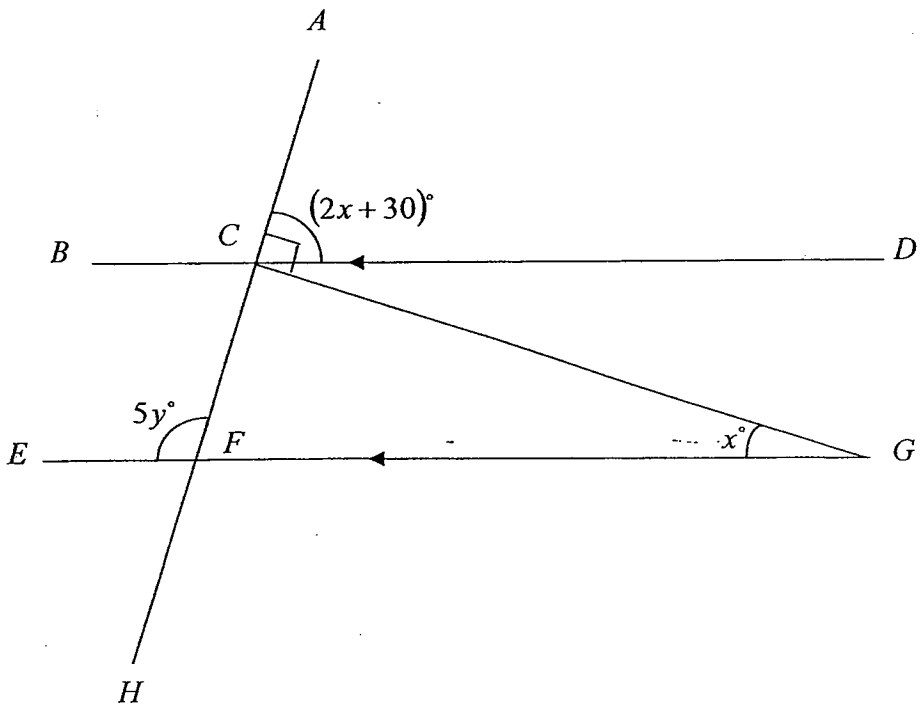
(b) _____ [2]

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10. In the diagram below, BD, EG and AH are straight lines, where BD // EG and AH is a transversal. $\angle ACG = 90°$, $\angle ACD = (2x + 30)°$, $\angle CFE = 5y°$, and $\angle CGF = x°$.
Find the values of x and y. Show your reasoning clearly.



Answer

$x =$ _____ [2]

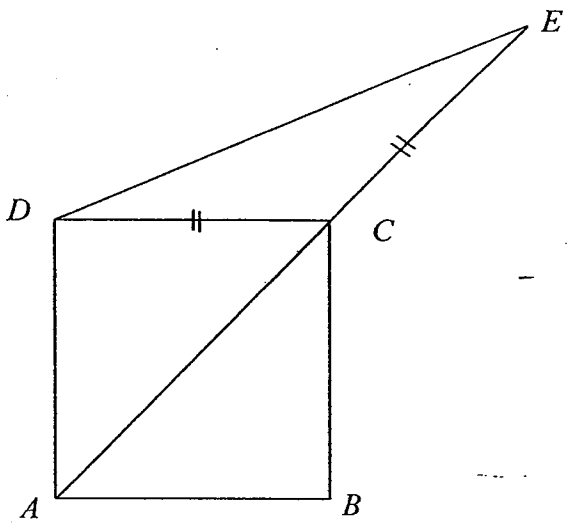
$y =$ _____ [2]

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11. In the figure, $ABCD$ is a square, ACE is a straight line and CDE is an isosceles triangle. Find $\angle CDE$. Show your reasoning clearly.



Answer _____ [3]

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12. Consider the number pattern below:

5, 11, 17, 23, 29, 35, 41

(a) Write down the 10^{th} term of the pattern.

Answer

(a) _____ [1]

(b) Write down the n^{th} term of the pattern.

Answer

(b) _____ [1]

(c) Write down the term which has a value of 227.

Answer

(c) _____ [1]

(d) Hence or otherwise, find the sum of

$5 + 11 + 17 + 23 + 29 + \ldots \ldots + 215 + 221 + 227.$

Answer

(d) _____ [2]

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13. The Tan family pays a subscription fee of $\$ x$ monthly for their residential phone line. In addition, usage is charged at one cent per minute. Let C be the Tan Family's monthly phone bill and n be the number of minutes of usage.

(a) Write down a formula relating C, x and n.

Answer

(a) _____ [1]

(b) If the Tan family's phone bill for the month of January is \$9.15, find the monthly subscription fee given the usage is 1 hour 5 minutes.

Answer

(b) _____ [2]

(c) The Tan Family's phone bill for the month of February is \$9.85. Given that the monthly subscription fee remains the same, find the amount of usage for February, giving your answer in hours and minutes.

Answer

(c) _____ h _____ mins [2]

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14. A fan club comprising girls and boys has a total of 160 members.

(a) Let x be the number of girls in the fan club. Express in terms of x, the percentage of the girls in the fan club.

Answer

(a) _____ [1]

(b) If 32 more girls join the club, the percentage of girls in the fan club will increase by 5%. Express in terms of x, the new percentage of the girls in the fan club now.

Answer

(b) _____ [1]

(c) Using **(a)** and **(b)**, form an equation involving x to find the number of boys in the club.

Answer

(c) _____ [3]

End of paper

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Answer Key:

1(a) $\sqrt{64}, -\frac{9}{3}, 0$

1(b) $\sqrt{2}$

2 $\frac{4}{5}$, 0.83, $0.8\dot{3}$, 0.835, $0.\dot{8}\dot{3}$

3(a) $120\,m/s$

3(b) $200cm/s$

4 200

5 $10-11ab-6a+6b$

6(a) $x=3,\ y=2,\ z=1$

6(b) 147

7(a) $-8a+4ab$

7(b) $\frac{-47g+28h}{24}$

8(a) $-7s(r+4t)$

8(b) $3(3h-1)(g+5)$

9(a) $x=3$

9(b) 225

10 $x=20, y=22$

11 22.5°

12(a) 59

12(b) $6n$-1

12(c) 38

12(d) 4408

13(a) $C=x+0.01n$

13(b) \$8.50

13(c) 2 h 15 mins

14(a) $\frac{5}{8}x\%$

14(b) $\frac{25(x+2)}{48}\%$

14(c) 122

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