Name:	Class:	Class Register No:

中正中学

CHUNG CHENGHIGH SCHOOL (MAIN)

50

Parent's Signature

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MID-YEAR EXAMINATION 2011
SECONDARY 1

Mathematics	**Thursday, 5 May**
Paper 1	**1 hour 15 minutes**

Instructions to Candidates:

1. Write your name, class and index number in the space provided on the cover page of this booklet.
2. Write only in dark blue or black pen.
3. Do not use staples, highlighter, paper clips, glue or correction fluid.
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5. If you use more paper than the booklet, fasten the sheets together.
6. If working is needed for any question, it must be shown clearly with the answer in the space provided for that question.
7. You may use a pencil for any diagrams or graphs.

Information For Candidates:

Calculators should be used where appropriate.

Omission of essential workings will result in loss of marks.

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.

The intended marks for the question or parts of the question are given in brackets [ ].
The total number of marks for this paper is 50.

You are reminded of the need for clear presentation in your answers.

This question paper consists of **8** printed pages (including this cover page)

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Answer all the questions.

For Examiner's Use

1. For the following numbers:

$$(-2)^2 \ , \ 5 \ , \ \sqrt{11} \ , \ 13 \ , \ 0 \ , \ 1 \ , \ 2 \ , \ 3.17\dot{} \ , \ 7$$

(a) list all the prime numbers,

Answer: (a).....[1]

(b) represent all the non-prime numbers on a number line.



[2]

2. (a) Estimate the following to 2 significant figures

(i) 25475,

(ii) 1.4990,

(iii) 0.05048.

(b) **Hence,** estimate the value of $\frac{25475+1.4990}{0.05048\times100}$ to 1 significant figure.

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

(ii)..... [1]

(iii)..... [1]

(b).....[2]

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3. (a) Express 1500 as the product of its prime factors.

(b) Given that $1500x$ is a perfect square, write down the smallest possible value of x.

(c) Find the highest common factor of 1500 and $2 \times 3^2 \times 5^2 \times 7$, leaving your answer in index form.

Answer: (a) 1500 =.....[2]

(b) x = ...[1]

(c) HCF (1500, $2 \times 3^2 \times 5^2 \times 7$) = ...[1]

4. Three bullet trains take 1 minute, 1 minute 12 seconds and 1 minute 24 seconds to move from one station to another. The three bullet trains started together at 0900 hrs from the same station. Find the time, in hours, when the three bullet trains will meet for the first time after leaving the station.

Answer: ..... *hours* [3]

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5. **Without the use of calculator,** evaluate

(a) $14 + 2^2 \times 6 \div 3 - 6$,

(b) $\sqrt[3]{\frac{24+(-2)^3}{2}}$,

showing all your workings clearly.

Answer : (a) .....[2]

(b) .....[3]

6. If $x^2 = \frac{ab-5c}{d}$, find the value of x^2 when $a = -6, b = -5, c = 4$, and $d = \frac{2}{5}$.

Hence, find the values of x.

Answer: $x^2 =$ ..... [2]

$x =$ ..... or .....[2]

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7. Simplify

(a) $18a - 9b + 12a - 6b$,

(b) $23mn^2 - 4mn \times 2n$,

(c) $-3pq \times \sqrt{36p^2q^4}$.

Answer : (a) ..... [2]

(b) ..... [3]

(c) ..... [2]

8. Factorise

(a) $12rs - 3st + 6rst$,

(b) $12pr - 9p - 3q + 4qr$.

Answer : (a) ..... [2]

(b) ..... [3]

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9. Find the value of x for

(a) $3(2x+5)-(x+3)=2$,

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

Answer : (a) ..... [3]

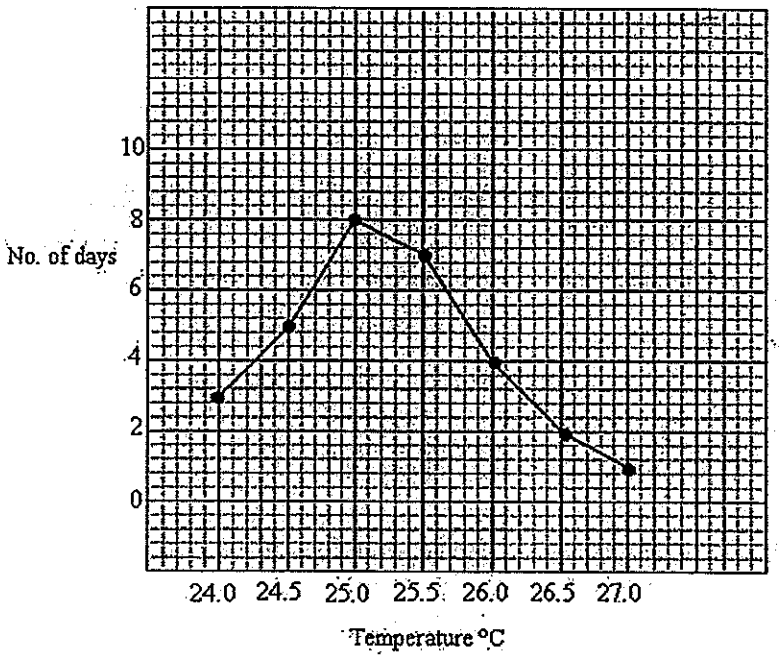
(b) ..... [3]

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10. The line graph below shows the daily noon temperature recorded by Melissa for her Science project for the month of October.



(a) What was the highest noon temperature for the month?

(b) What was the most common noon temperature for the month?

(c) Calculate the total number of days when the noon temperatures were not lower than 25.0°C.

Answer : (a) .....[1]

(b) .....[1]

(c) .....[2]

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11. The diagram shows the first three figures of a sequence made up of square tiles of equal size. The shaded tiles are surrounded by white tiles. In Figure 1, one black tile is surrounded by 8 white tiles. In Figure 2, two black tiles are surrounded by 10 white tiles and so on.

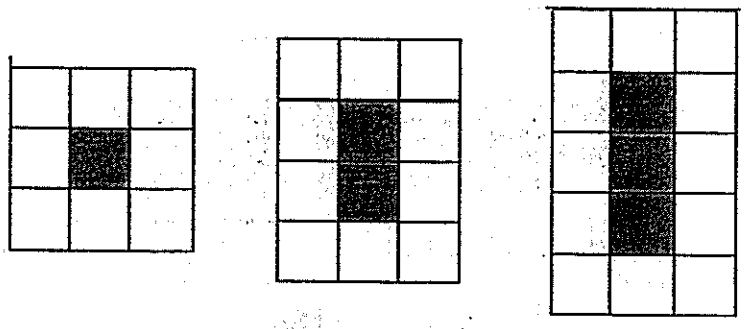


Figure 1 Figure 2 Figure 3

(a) Draw Figure 4 where there are 4 black tiles. State the number of white tiles.

(b) If the n^{th} figure has n black tiles, how many white tiles are there for the n^{th} figure?

(c) Hence, find the number of black and white tiles for the 100^{th} figure.

Answer : *(a)* ..... white tiles [1]

(b) No. of white tiles = ...[1]

(c) ..... black tiles ; ..... white tiles [2]

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MID-YEAR EXAMINATION 2011
SECONDARY 1

Mathematics	**Thursday, 5 May**
Paper 1	**1 hour 15 minutes**

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Information For Candidates:

CALCULATORS ARE ALLOWED FOR THIS PAPER.

OMISSION OF ESSENTIAL WORKINGS WILL RESULT IN LOSS OF MARKS.

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Answer all the questions.

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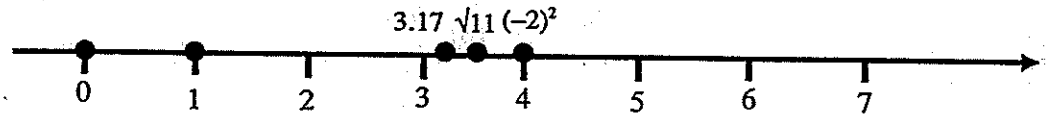
1 For the following numbers:

$$(-2)^2 \ , \ 5 \ , \ \sqrt{11} \ , \ 13 \ , \ 0 \ , \ 1 \ , \ 2 \ , \ 3.17\dot{}, \ 7$$

(a) list all the prime numbers,

Answer(a) 2, 5, 7 **[B1]**

(b) represent all the non-prime numbers on a number line.



[B2]

2 (a)Estimate the following to 2 significant figures

(i) 25475,

(ii) 1.4990,

(iii) 0.05048.

(b)**Hence**, estimate the value of $\frac{25475+1.4990}{0.05048\times100}$ to 1 significant figure.

$\frac{25475+1.4990}{0.05048\times100} \approx \frac{25000+1.5}{0.050\times100}$ **M1** – correct substitution of previous numbers

$= 5000$ (to 1 sig fig) **A1**

Answer(a) *(i)* 25 000 **[B1]**

(ii) 1.5 **[B1]**

(ii) 0.050 **[B1]**

(b) 5000 [2]

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3 (a) Express 1500 as the product of its prime factors.

(b) Given that $1500x$ is a perfect square, write down the smallest possible value of x.

(c) Find the highest common factor of 1500 and $2 \times 3^2 \times 5^2 \times 7$, leaving your answer in index form.

(a) $1500 = 2^2 \times 3 \times 5^3$ **A1**

(b) $1500x = 2^2 \times 3 \times 5^3 \times 3 \times 5$
$x = 15$

2	1500
2	750
3	375
5	125
5	25
5	5
	1

M1

Answer(a) 1500 = $2^2 \times 3 \times 5^3$ [2]

(b) $x = 15$ **[B1]**

(c) HCF (1500, $2 \times 3^1 \times 5^2 \times 7$) = $2 \times 3 \times 5^2$ **[B1]**

4. Three bullet trains take 1 minute, 1 minute 12 seconds and 1 minute 24 seconds to movefrom one station to another. The three bullet trains started together at 0900 hrs from thesame station. Find the time, in hours, when the three bullet trains will meet for the firsttime.

2	60, 72, 84
2	30, 36, 42
3	15, 18, 21
5	5, 6, 7
7	1, 6, 7
6	1, 6, 1
	1, 1, 1

LCM (60, 72, 84) = $2^3 \times 3^2 \times 5 \times 7$
= 2 520

M1 – *students need to show understanding of concept of LCM, even if values are incorrect.*

Time they will meet = 2 520 s
= 42 min

Time they will meet = 09 00 + 00 42
= 09 42 hours **A1**

M1 – *addition of time*

*Answer*09 42*hours* [3]

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5. **Without the use of calculator,** evaluate

(a) $14 + 2^2 \times 6 \div 3 - 6$,

(b) $\sqrt[3]{\dfrac{24+(-2)^3}{2}}$.

(a) $14 + 2^2 \times 6 \div 3 - 6 = 14 + 4 \times 2 - 6$ **M1cao:** *calculate $(2)^2$ and $6 \div 3$ correctly*

$= 14 + 8 - 6$

$= 16$ **A1**

$\sqrt[3]{\dfrac{24+(-2)^3}{2}} = \sqrt[3]{\dfrac{24-8}{2}}$ **M1cao:** operate $(-2)^3$ correctly

(b) $= \sqrt[3]{8}$ **M1cao:** gets the value 8 correctly

$= 2$ **A1**

*Answer : (a)*16 [2]

(c) 2 [3]

6. If $x^2 = \dfrac{ab-5c}{d}$, find the value of x^2 when $a = -6, b = -5, c = 4$, and $d = \dfrac{2}{5}$.

Hence, find the values of x.

$x^2 = \dfrac{ab-5c}{d}$

$= \dfrac{(-6)(-5)-5(4)}{\frac{2}{5}}$ **M1** – correct substitution

$= 25$ **A1**

$x^2 = 25$

$x = 5$ or -5

B1 **B1**

Answer: $x^2 = 25$ [2]

$x = 5$ or -5 [2]

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7. Simplify

(a) $18a - 9b + 12a - 6b$,

(b) $23mn^2 - 4mn \times 2n$,

(c) $-3pq \times \sqrt{36p^2q^4}$

(a) $18a - 9b + 12a - 6b = 18a + 12a - 9b - 6b$ **M1:** *attempt to add / subtract like terms*
$= 30a - 15b$ *or* $15(2a - b)$ **A1**

(b) $23mn^2 - 4mn \times 2n = 23mn^2 - 8mn^2$ **M1:** *divide last 2 terms correctly*
$= 5\,mn^2$ **A1**

(c) $-3pq \times \sqrt{36p^2q^4} = -3pq \times 6pq^2$ **M1cao** – *square root expression correctly*
$= -18p^2q^3$ **A1**

Answer : (a) $30a - 15b$ [2]

(b) $5\,mn^2$ [2]

(c) $-18p^2q^3$ [2]

8.Factorise

(a) $12rs - 3st + 6rst$,

(b) $12\,pr - 9\,p - 3q + 4qr$.

(a) $12rs - 3st + 6rst = 3(4rs - st + 2rst)$ ***M1***
$= 3s(4r - t + 2rt)$ ***A1 (or B2)***

(b) $12pr - 9p - 3q + 4qr = 12pr + 4qr - 9p - 3q$

$= 4r(3p + q) - 3(3p + q)$ **B1 / B1** *each for correct factorisation*

$= (4r - 3)(3p + q)$ **A1**

Answer : (a) $3s(4r - t + 2rt)$ [2]

(b) $(4r - 3)(3p + q)$ [3]

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9. Find the value of x for

(a) $3(2x+5)-(x+3)=2$,

(b) $\frac{1}{4}(2x+4)=\frac{1}{3}(3x-1)$.

(a) $6x + 15 - x - 3 = 2$

$6x - x = 2 - 15 + 3$ *M1cao: group like terms correctly*

$5x = -10$ *M1: attempt to simplify*

$x = -2$ *A1*

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

$3(2x+4)=4(3x-1)$ **M1:** correct expansion of terms on LHS and

$6x+12=12x-4$

$12x-6x=12+4$ **M1:** bringing like terms on each side

$6x=16$

$x=2\frac{2}{3}$ **A1**

Answer : (a) $x = -2$[3]

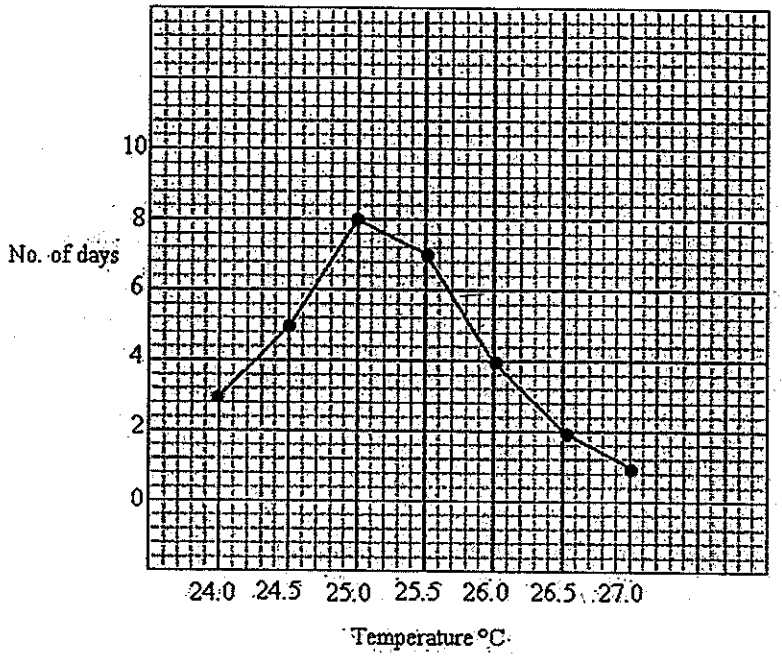
(b) $x = 2\frac{2}{3}$[3]

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10. The line graph below shows the daily noon temperature recorded by Melissa for her Science project for the month of October.



(a) What was the lowest noon temperature for the month?

(b) How many days was the temperature 26°C in October?

(c) Calculate the total number of days when the noon temperatures were not lower than 25.0°C.

(c) Total no. of days = 8 + 7 +4 + 2 + **1M1cao**
= 22 **A1**

*Answer : (a)*24.0°C **[B1]**

(b) 4 days **[B1]**

(c) 22 days [2]

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11. The diagram shows the first 3 of a sequence of figures made up of square tiles of equalsize. The shaded tiles are surrounded by white tiles. In Figure 1, one black tile is surrounded by 8 white tiles. In Figure 2, two black tiles are surrounded by 10 white tilesand so on.

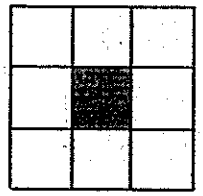


Figure 1

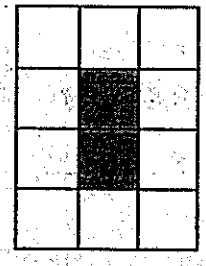


Figure 2

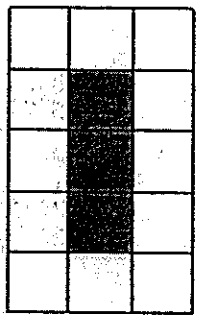
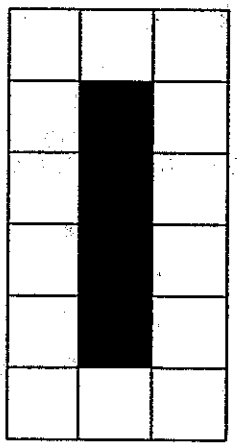


Figure 3

(a) Draw Figure 4 where there are 4 black tiles. State the number of white tiles.
(b) If the n^{th} figure has n black tiles, how many white tiles are there for the n^{th} figure?
(c) Hence, find the number of black and white tiles for the 100^{th} figure.

(a)



B1

(b) nth term: black tile = n; white tile = $2n + 6$

(c) 100^{th} Figure: black tile = 100; white tile = 2 (100) + 6
= 206

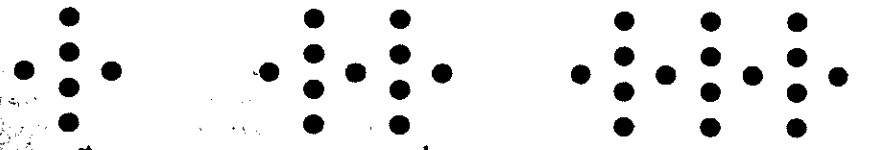
Answer : (a) 8 white tiles **[B1]**

(b)No. of white tiles = $2n + 6$**[B1]**

(c) 100 black tiles ; 206 white tiles **[B2]**

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1. Michael used m & m's chocolate sweets to make a series of patterns. The first 3 patterns he constructed are shown below.



1st 2nd 3rd

The number of sweets used are as follows:
1st pattern : 6
2nd pattern : 11
3rd pattern : 16

(a) Write down the number of sweets used in making the 4th pattern. [1]

(b) Write down a formula, in terms of n, for the number of sweets in the nth pattern. [1]

(c) How many sweets are there in the 60th pattern? [1]

(d) Find which pattern consists of $\sqrt{246016}$ sweets. [2]

(e) Would it be possible for a pattern to consist of 643 sweets? Give a reason for your answer. [2]

2 (a) $\sqrt{5\frac{1}{16}}$ can be expressed as the rational number $\frac{p}{q}$ where p and q are integers. Find the value of p and the value of q. [2]

(b) Write down an example of an irrational number. [1]

3. Solve the equations
(a) $2(y-2)=7$, [3]
(b) $x-6=4(1-x)$. [3]

4. With the use of a calculator, evaluate the following, correcting your answers to 3 significant figures.
(a) $\dfrac{\sqrt{24.79+1.88}}{(4.2-1.6)^3}+\dfrac{7}{5}$, [1]
(b) $\sqrt[3]{\dfrac{35.44-6(-2)}{125}}-\dfrac{(2.21-2.1)^2}{3.4}$ [1]

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5. A company *ABC*, specializes in making T-shirts. It charges a basic of \$59 plus \$8 for each T-shirt ordered.

(a) Write down a formula connecting the total cost (P dollars) and the number of T-shirts (N) ordered. [1]

(b) Hence, by substituting a value for N, find the cost of ordering 50 T-shirts. [2]

6. A six-sided die is thrown 29 times.
The results are shown below :

1	6	2	2	3	1	1	2	2	4
5	1	2	6	2	6	1	3	2	4
3	6	1	5	2	3	2	1	6	

(a) **Copy and complete** the frequency table. [2]

Number on die	1	2	3	4	5	6
Frequency						

(b) Represent the frequency distribution using a histogram. [3]

(c) Find the most common number shown on the die. [1]

(d) The die is thrown one more time. Find the number shown on the die if the average of the 30 throws is to be exactly 3. [2]

7 (a) Subtract $2a - 5b + 4x$ from $2x - 5a + 3b$. [3]

(b) Factorise $ab - 2ad - bc + 2cd$ completely. [3]

(c) Factorise $8(b - a) + y(a - b)$ completely. [2]

(d) Simplify $\frac{x}{10} - \frac{x-5}{5}$. [3]

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8. Sharon has 4 pieces of rope with length of 36m, 144m, 252m and 168m. She wishes to cut the 4 pieces of rope into smaller pieces of rope of equal length with no remainders.

(a) What is the greatest possible length of each of the smaller pieces of rope? [3]

(b) How many of the smaller pieces of rope of equal length can she get? [2]

9. During their quest to reach the South Pole on the first day of the new millennium, the Singapore Antarctica 2000 Expedition experienced temperatures ranging from $-35℃$ to $-5℃$ while their family in Singapore experienced temperatures ranging from $26℃$ to $34.5℃$, find

(a) the greatest difference in temperature between South Pole and Singapore, [2]

(b) the smallest difference in temperature between South Pole and Singapore, [1]

(c) the temperature midway between the highest and lowest temperature at South Pole. [2]

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Marking Scheme (Sec 1 MYE Paper 2)

1) (a) No. of sweets in 4^{th} pattern = **21** **[B1]**

(b) No. of sweets in the n^{th} pattern = $5n+1$ **[B1]**

(c) No. of sweets in the 60^{th} pattern = $5(60)+1$

$= 301$ **[B1]**

(d) $\sqrt{246016} = 496$ **[M1cao]**

$496 = 5n + 1$

$n = (496-1)/5$

$n = 99$ **[A1]**

(e) No. **[B1]**

The last digit '3' is not 6 or 1. **[B1]**

2)

(a) $\sqrt{5\frac{1}{16}} = \sqrt{\frac{81}{16}}$ [M1cao]

$= \frac{9}{4}$

$\therefore p = 9,\ q = 4$ **[A1]**

(b) Any irrational number e.g. $\sqrt{2}$, $\sqrt{5}$ **[B1]**

3)

(a) $2(y-2) = 7$

$2y - 4 = 7$ [M1cao]

$2y = 11$ [M1]

$y = 5\frac{1}{2}$ [A1]

(b) $x - 6 = 4(1-x)$

$x - 6 = 4 - 4x$ [M1cao]

$5x = 10$ [M1]

$x = 2$ [A1]

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4(*a*) $\dfrac{\sqrt{24.79+1.88}}{(4.2-1.6)^3}+\dfrac{35}{(-5)^2}=1.69$ (3sf) [B1]

(*b*) $\sqrt[3]{\dfrac{35.44-6(-2)}{125}}-\dfrac{(2.21-2.1)^2}{3.4}=0.720$ (3*sf*) [B1]

5) (a) $P = 59 + 8N$ **[B1]**

(b) Cost of ordering 50 T-shirts = \$ [59 + 8(50)] **[M1]**

= \$ (59 + 400)

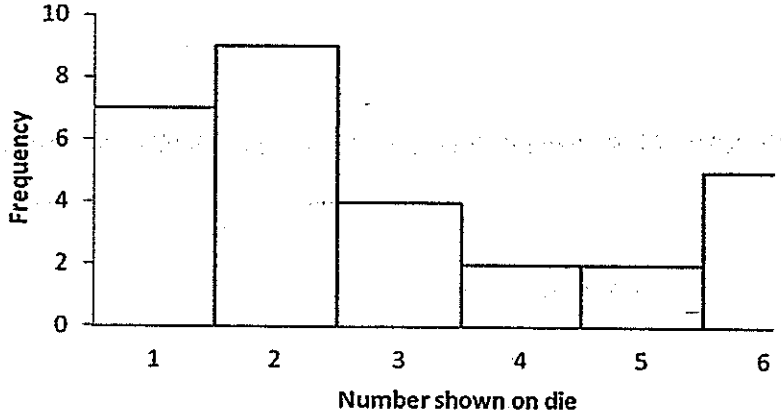
= \$ 459 **[A1]**

6. (a)

Number on die	1	2	3	4	5	6
Frequency	7	9	4	2	2	5

[B2]

(b)



(c) The most common number shown on die = 2 **[B1]**

(d) Sum of number shown on die for 29 throws = 1(7) + 2(9) + 3(4) + 4(2) + 5(2) + 6(5)

= 85 **[M1cao]**

Number shown on die for 30th throw = 30(3) – 85

= 5 **[A1]**

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7(a) $2x-5a+3b-(2a-5b+4x)$ [M1]

$=2x-5a+3b-2a+5b-4x$ [M1cao]

$=2x-4x-5a-2a+3b+5b$

$=-2x-7a+8b$ [A1]

7(b) $ab-2ad-bc+2cd$

$=(ab-2ad)-(bc-2cd)$ [M1cao]

$=a(b-2d)-c(b-2d)$ [M1cao]

$=(b-2d)(a-c)$ [A1]

7(c) $8(b-a)+y(a-b)$

$=8(b-a)-y(b-a)$ [M1cao]

$=(b-a)(8-y)$ [A1]

7(d) $\frac{x}{10}-\frac{x-5}{5}=\frac{x}{10}-\frac{2x-10}{10}$ [M1cao]

$=\frac{x-(2x-10)}{10}$

$=\frac{x-2x+10}{10}$ [M1cao]

$=\frac{-x+10}{10}$

$=-\frac{x}{10}+1$ [A1]

8. (a)

2	36	144	252	168
2	18	72	126	84
3	9	36	63	42
	3	12	21	14

[M1cao]

Greatest possible length = 2 x 2 x 3 **[M1cao]**

= 12 m **[A1]**

(b) No. of smaller pieces of rope = 3 + 12 + 21 + 14 **[M1]**

= 50 **[A1]**

9. (a) Greatest temperature difference = 34.5 – (–35) **[M1cao]**

= 69.5°C **[A1]**

(b) Smallest temperature difference = 26 – (–5)

= 31 °C **[B1]**

(c) Temperature midway between –35 °C and –5 °C $=\frac{-35+(-5)}{2}$ **[M1cao]**

= – 20 °C **[A1]**

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