Name:	Class:	Class Register No:

中正中学

CHUNG CHENG HIGH SCHOOL (MAIN)

40

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MID-YEAR EXAMINATION 2012
SECONDARY 1

Mathematics
Paper 1

Tuesday 8 May
1 hour

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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.
4. All answers are to be written on the question paper in the space provided.
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 40.

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

This question paper consists of **7** printed pages (including this cover page).

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For Examiner's Use

Answer all the questions.

For Examiner's Use

1 Consider the following numbers.

$$\frac{3}{11},\ 0.25,\ \sqrt{7},\ 29,\ 12,\ \sqrt{169},\ 81,\ 17,\ 144,\ \pi$$

Write down all

(a) the prime numbers,

(b) the square numbers,

(c) the irrational numbers.

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

(b) ..... [1]

(c) ..... [1]

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2 Write down the following numbers in order of size, starting with the smallest.

$$-0.88,\quad 2,\quad -0.17,\quad -1.4,\quad -3$$

Answer : ..... [1]

3 **(a)** Add brackets to the expression below to make it correct.

$$126 \div 9 \times 7 + 27 - 19 = 10$$ [1]

(b) Fill in the boxes with the correct operations to make the mathematical sentence true.

$$21 \div 3 \square 7 - 6 \square 4 = 47$$ [2]

4 Estimate the following numbers to 2 significant figures

(a) 25487 ,

(b) 1.4990 ,

(c) 0.04048 .

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

(b)..... [1]

(c)..... [1]

For Examiner's Use

5 Write down the next two terms of the following number sequence.

(a) 16, 12, 8, 4, _____ , _____ .

(b) $9, -3, 1, -\frac{1}{3}, \frac{1}{9}$, _____ , _____ .

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

(b)..... , ... [1]

For Examiner's Use

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6 Petrol costs n cents per litre. Gary buys some petrol and it costs him m dollars. Write down a simplified expression, in terms of n and m, for the number of litres that Gary buys.

Answer : .....litres [1]

7 Given that $h = \frac{3u^2}{8g}$, calculate the value of g when $u = 32$ and $h = 7.9$.

Answer : g = ... [2]

For Examiner's Use

For Examiner's Use

8 John bought 30 cartons of eggs. There were x eggs in each carton.

(a) Write down an expression in terms of x for the number of eggs he has bought.

(b) When the cartons were opened, he found that y eggs were broken. He shared the unbroken eggs equally between 50 baskets. Write an expression in terms of x and y, the number of eggs in each basket.

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

(b) ..... eggs [1]

9 Simplify the following algebraic expressions

(a) $27mn^2 - 4mn \times 3n$,

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

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

(b) ..... [2]

For Examiner's Use

For Examiner's Use

10 Factorise completely

(a) $20nm - 4m$,

(b) $7a^3y^2 - 21ay^3$,

(c) $15pq - 5q + r - 3pr$.

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

(b) ..... [1]

(c) ..... [3]

11 Solve the inequality $3n - \frac{4}{5}n > 40$.

Hence, find the smallest possible value of n if

(a) n is a prime number ,

(b) n is divisible by 7 .

Answer : ..... [2]

(a) Smallest possible value of n = ... [1]

(b) Smallest possible value of n = ... [1]

For Examiner's Use

For Examiner's Use

12 Solve the following equations

(a) $2b - 5 = 4 - 3(b+2)$,

(b) $\frac{7}{2a-1} = \frac{2}{a+1}$.

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

(b)..... [3]

For Examiner's Use

13 Express $0.48 : 2\frac{5}{8}$ as a ratio in its lowest terms.

For Examiner's Use

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Answer : ..... [2]

14 A candle is 25 cm long. After burning for 6 minutes, the candle is 21 cm long. What is the time duration taken for the remaining candle to burn out at the same rate ?

Answer : ..... [2]

End of Paper

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Name:	Class:	Class Register No:

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MID-YEAR EXAMINATION 2012
SECONDARY 1

Mathematics
Paper 2

Monday 30 April
1 hour 30 minutes

Additional Materials: Answer paper

Instructions to Candidates

1. Write your name, class and register number in the space provided on the cover page of this booklet and answer paper.
2. Write only in dark blue or black pen.
3. You may use a pencil for any diagrams or graphs.
4. Do not use staples, paper clips, highlighters, glue, correction fluid or tape.
5. If working is needed for any question it must be shown with the answer.
6. Fasten the answer sheets together.
7. 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.
8. For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

Information For Candidates:

CALCULATORS ARE ALLOWED FOR THIS PAPER.

OMISSION OF ESSENTIAL WORKINGS WILL RESULT IN LOSS OF MARKS.

At the end of the examination, fasten all your work securely together.
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 60.

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

This question paper consists of 4 printed pages (including this cover page).

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1 (a) Evaluate $\dfrac{-7}{\sqrt{(-1\frac{1}{2})^2+(-2)^2}}+1\frac{3}{5}$. [1]

(b) Evaluate $\left[\sqrt[3]{117}-3(-2)\right]-(-3)^2$, leaving your answer in 3 significant figures. [1]

(c) Both liquids A and B used in an experiment were at a temperature of $-4°C$.

(i) Liquid A was heated until its temperature rose by 12°C. Write down its new temperature. [1]

(ii) Liquid B was cooled until its temperature fell by 8°C. Write down its new temperature. [1]

(iii) Hence, find the difference between the final temperatures of the two liquids. [1]

(d) Express $\frac{136}{333}$ as a

(i) recurring decimal, [1]

(ii) decimal corrected to 5 decimal places, [1]

(iii) decimal corrected to 3 significant figures. [1]

2 (a) Simplify

(i) $3(k-5)-3[2-4(k-3)]$, [3]

(ii) $\dfrac{2x-3y}{2}-\dfrac{3x-2y}{3}$. [3]

(b) What must be added to $3x^3-4x^2+2x-6$ to get $9-4x+5x^2+7x^3$? [3]

(c) Factorize $6ac-21bc+35bd-10ad$. [3]

3 (a) Solve $3x+7(x+2)=4(5-3x)+7$. [3]

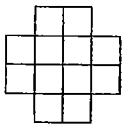
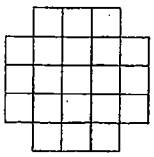
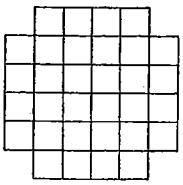
(b) Solve $\frac{2}{9}(x-4)-\frac{x-1}{4}=\frac{3}{2}$. [3]

(c) Given that $x=3(y-2z)$, find the value of z when $x=21$ and $y=42$. [3]

(d) A carpenter needs at least 400 nails to construct a wooden structure. The nails are sold in packets of one dozen. Use inequality to find the minimum number of packets of nails he has to buy. [3]

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4 The table below shows a sequence formed by small squares of sides 1cm each.

Figure	Perimeter of Figure (cm)	Area of figure (cm^2)
Figure 1	12	$1^2+1\times4$
 Figure 2	16	$2^2+2\times4$
 Figure 3	20	$3^2+3\times4$
 Figure 4	24	$4^2+4\times4$

(a) Draw Figure 1 on the answer script. [1]

(b) Write down in terms of n, the perimeter of the n^{th} figure. [1]

(c) Hence, find the perimeter of Figure 99. [1]

(d) If the area of the figure is $117cm^2$, find the figure number. [2]

5 **(a)** Given that $a=2, b=-3$ *and* $c=-1$, evaluate

(i) $\frac{a}{b}+\frac{c}{a}+\frac{b}{c}$, [2]

(ii) $b^2-\frac{4(b+a)-c}{3c+b}$. [2]

(b) **(i)** Express 168 as a product of its prime factors, giving your answer in index notation. [1]

(ii) Hence, find the smallest integer, k, such that $168k$ is a perfect cube. [2]

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6 **(a)** During teachers' day celebrations, the students' council distributed 315 pens, 420 pencils and 525 bookmarks equally to the teachers of the school. Find the largest possible number of teachers in the school that received the gifts. [3]

(b) Three electric toy cars are made to race around an oval track at the same time. Car X completes 1 lap in 110 second, Car Y in 80 seconds while Car Z completes in 90 seconds. How long will it take before the three toy cars are at the starting point together again? [3]

7 **(a)** A photocopy machine can print 15 copies per minute.

(i) How many copies can it print in 30 minutes? [1]

(ii) How long does it take to print 25 copies? [1]
(Leave your answers in minutes and seconds)

(b) A passenger train left Singapore at 0800 and travelled at an average speed of x km/h to Kuala Lumpur which is 360 km away. At 0900, a goods train left Kuala Lumpur for Singapore, travelling at an average speed which was slower than the passenger train by 20km/h. Both trains were running on parallel tracks and they passed each other at 1030.

(i) Write down an expression in terms of x, for the average speed of the goods train. [1]

(ii) Find, an expression in terms of x for the distance traveled by the passenger train just before it passed the postal train. [1]

(iii) Form an equation in terms of x and solve it to find the average speed of the passenger train. [3]

(c) **(i)** There were 329 apples in container A. The ratio of apples in container A to container B is 7:3. Find the total number of apples. [1]

(ii) Some apples are transferred from container A to B. Now container B has $\frac{2}{3}$ the number of apples in container A. Find the number of apples that were transferred to container B. [2]

End of Paper

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中正中学

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MID-YEAR EXAMINATION 2012
SECONDARY 1

Mathematics **Tuesday 8 May**

Paper 1 **MARKING SCHEME** **1 hour**

Instructions to Candidates:

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Answer all the questions.

For Examiner's Use

For Examiner's Use

1 Consider the following numbers.

$$\frac{3}{11},\ 0.25,\ \sqrt{7},\ 29,\ 12,\ \sqrt{169},\ 81,\ 17,\ 144,\ \pi$$

Write down all
(a) the prime numbers,
(b) the square numbers,
(c) the irrational numbers.

Answer : (a) $\sqrt{169},\ 17,\ 29$ [B1]

(b) $81, 144$ [B1]

(c) $\sqrt{7}, \pi$ [B1]

2 Write down the following numbers in order of size, starting with the smallest.

$$-0.88,\ 2,\ -0.17,\ -1.4,\ -3$$

Answer : $-3,\ -1.4, -0.88,\ -0.17,\ 2$ [B1]

3 **(a)** Add brackets to the expression below to make it correct.

$$126 \div \left(9 \times 7\right) + 27 - 19 = 10$$ [B1]

(b) Fill in the boxes with the correct operations to make the mathematical sentence true.

$$21 \div 3 \ \boxed{\times}\ 7 - 6 \ \boxed{+}\ 4 = 47$$ [B1, B1]

4 Estimate the following numbers to 2 significant figures
(a) 25487 ,
(b) 1.4990 ,
(c) 0.04048 .

Answer: (a) $25\,000\ (2\text{s.f})$ [B1]

(b) $1.5\ (2\text{s.f})$ [B1]

(c) $0.040\ (2\text{s.f})$ [B1]

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5 Write down the next two terms of the following number sequence.

(a) 16, 12, 8, 4, _____, _____.

(b) $9, -3, 1, -\frac{1}{3}, \frac{1}{9}$, _____, _____.

Answer: (a) 0, −4 [B1]

(b) $-\frac{1}{27}, \frac{1}{81}$ [B1]

6 Petrol costs n cents per litre. Gary buys some petrol and it costs him m dollars. Write down a simplified expression, in terms of n and m, for the number of litres that Gary buys.

$$\text{No. of litres Gary buys} = \frac{m \times 100}{n}$$
$$= \frac{100m}{n}$$

Answer : $\frac{100m}{n}$ litres [B1]

7 Given that $h = \frac{3u^2}{8g}$, calculate the value of g when $u = 32$ and $h = 7.9$.

$$h = \frac{3u^2}{8g}$$
$$7.9 = \frac{3(32)^2}{8g} \quad \text{------ M1 cao for direct substitution of values into formula}$$
$$63.2g = 3072$$
$$g = 48\frac{48}{79} \text{ or } 48.6\,(3.s.f) \quad \text{---- A1}$$

Answer : $g = 48\frac{48}{79}$ *or* $48.6\,(3.s.f)$ [2]

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For Examiner's Use

8 John bought 30 cartons of eggs. There were x eggs in each carton.

(a) Write down an expression in terms of x for the number of eggs he has bought.

(b) When the cartons were opened, he found that y eggs were broken. He shared the unbroken eggs equally between 50 baskets. Write an expression in terms of x and y, the number of eggs in each basket.

$a)$ *No. of eggs John bought* $= 30x$

$b)$ *No. of eggs in each basket* $= \dfrac{30x - y}{50}$

Answer : (a) $30x$ [B1]

(b) $\dfrac{30x - y}{50}$ [B1]

9 Simplify the following algebraic expressions

(a) $27mn^2 - 4mn \times 3n$,

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

$a)\ 27mn^2 - 4mn \times 3n$

$= 27\,mn^2 - 12mn^2$ ------- $M1\ cao$

$= 15mn^2$ -------- $A1$

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

$= -3pq \times 6pq^2$ --- $M1\ cao$

$= -18p^2q^3$ ---- $A1$

Answer : (a) $15mn^2$ [2]

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(b) $\underline{-18p^2q^3}$ [2]

For Examiner's Use

10 Factorise completely

(a) $20nm-4m$,

(b) $7a^3y^2-21ay^3$,

(c) $15pq-5q+r-3pr$.

a) $20nm-4m$
$=4m(5n-1)$ ---B1

b) $7a^3y^2-21ay^3$
$=\underline{\underline{7ay^2}}\,\underline{\underline{(a^2-3y)}}$ ----B1

c) $15pq-5q+r-3pr$
$=5q(3p-1)+r(1-3p)$ ------ $M1\ cao\times 2$
$=\underline{\underline{5q(3p-1)}}-\underline{\underline{r(3p-1)}}$
$=(3p-1)(5q-r)$ ---- $A1$

Answer (a) $\underline{4m(5n-1)}$ [1]

(b) $\underline{7ay^2(a^2-3y)}$ [1]

(c) $\underline{(3p-1)(5q-r)}$ [3]

11 Solve the inequality $3n-\frac{4}{5}n>40$.

Hence, find the smallest possible value of n if

(a) n is a prime number ,

(b) n is divisible by 7 .

$3n-\frac{4}{5}n > 40$
$15n-4n > 200$ ---*M1 simplication*
$11n > 200$
$n > \frac{200}{11}$
$n > 18\frac{2}{11}$ ----*A1*

a) Since $n>18\frac{2}{11}$,
Hence smallest possible value of n that is a prime no.
$=19$ ----*B1*

b) Smallest possible value of n that is divisible by 7
$=21$ ----*B1*

Answer : $\underline{n > 18\frac{2}{11}}$ [2]

(b) Smallest possible value of $n=$ $\underline{19}$ [B1]

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(c) Smallest possible value of n = 21 [B1]

For Examiner's Use

12 Solve the following equations.

(a) $2b-5=4-3(b+2)$, .

(b) $\frac{7}{2a-1}=\frac{2}{a+1}$.

For Examiner's Use

a) $2b-5=4-3(b+2)$

$2b-5=4-3b-6$ ----- $M1$ *cao*

$2b-5=-3b-2$

$2b+3b=-2+5$ ----- $M1$ collect all b terms to one side

$5b=3$

$b=\frac{3}{5}$ ----- $A1$

(b) $\frac{7}{2a-1}=\frac{2}{a+1}$

$7(a+1)=2(2a-1)$ --- $M1$ *cao* (cross multiply)

$7a+7=4a-2$

$7a-4a=-2-7$ --- $M1$ collect all b terms to one side

$3a=-9$

$a=-3$ ---- $A1$

Answer: (a) $b=\frac{3}{5}$ [3]

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(b) $a = -3$ [3]

For Examiner's Use

13 Express $0.48 : 2\frac{5}{8}$ as a ratio in its lowest terms.

$0.48 : 2\frac{5}{8}$

$= 0.48 : 2.625$ *or* $\frac{48}{100} : \frac{21}{8}$ ---$M1$ *cao convert to same form*

$= 480 : 2625$ *or* $\frac{384}{800} : \frac{2100}{800}$

$= 32 : 175$ ----$A1$

Answer : $32 : 175$ [2]

14 A candle is 25 cm long. After burning for 6 minutes, the candle is 21 cm long. How much time is needed for the remaining candle to burn out at the same rate ?

Rate of candle burning

$= \frac{25 - 21\ cm}{6\ \text{min}}$ ----$M1$

$= \frac{4}{6}\ cm / \text{min}$

$= \frac{2}{3}\ cm / \text{min}$

$\therefore$ Time needed for remaining candle to burn out

$= 21 \div \frac{2}{3}$

$= 21 \times \frac{3}{2}$

$= 31\frac{1}{2}$ *or* 31.5 minutes ----$A1$

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Answer : $31\frac{1}{2}$ *or* 31.5 minutes [2]

End of Paper

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2012 Sec 1 Maths MYE Paper 2 Marking Scheme

1 **(a)** Evaluate $\dfrac{-7}{\sqrt{(-1\frac{1}{2})^2+(-2)^2}}+1\frac{3}{5}$. [1]

$\dfrac{-7}{\sqrt{(-1\frac{1}{2})^2+(-2)^2}}+1\frac{3}{5}=-1\frac{1}{5}$ [B1]

(b) Evaluate $\left[\sqrt[3]{117}-3(-2)\right]-(-3)^2$, leaving your answer in 3 significant figures. [1]

$\left[\sqrt[3]{117}-3(-2)\right]-(-3)^2=1.89$ (corr. to 3 s.f.) [B1]

(c) Both liquids A and B used in an experiment were at a temperature of $-4°C$.

(i) Liquid A was heated until its temperature rose by 12°C. Write down its new temperature. [1]

(ii) Liquid B was cooled until its temperature fell by 8°C. Write down its new temperature. [1]

(iii) Hence, find the difference between the final temperatures of the two liquids. [1]

(i)	New temp. = 8°C	[B1]
(ii)	New temp. = $-12°$ C	[B1]
(iii)	Difference in temp. = $8-(-12)=20°$ C	[B1]

(d) Express $\dfrac{136}{333}$ as a

(i) recurring decimal, [1]

(ii) decimal corrected to 5 decimal places, [1]

(iii) decimal corrected to 3 significant figures. [1]

(i)	$\dfrac{136}{333}=0.\dot{4}0\dot{8}$	[B1]
(ii)	$\dfrac{136}{333}=0.40841$ (corr. to 5dp)	[B1]
(iii)	$\dfrac{136}{333}=0.408$ (corr. to 3 sf)	[B1]

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2 (a) Simplify (i) $3(k-5)-3[2-4(k-3)]$, [3]

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

(i)	$3(k-5)-3[2-4(k-3)]=3k-15-3(2-4k+12)$	[M1 cao]
	$=3k-15-6+12k-36$	[M1]
	$=15k-57$	[A1]
(ii)	$\frac{2x-3y}{2}-\frac{3x-2y}{3}=\frac{3(2x-3y)-2(3x-2y)}{6}$	[M1] for correct denominator
	$=\frac{6x-9y-6x+4y}{6}$	[M1 cao]
	$=-\frac{5y}{6}$	[A1]

(b) What must be added to $3x^3-4x^2+2x-6$ to get $9-4x+5x^2+7x^3$? [3]

$9-4x+5x^2+7x^3-(3x^3-4x^2+2x-6)$	[M1 cao] for correct sequence with brackets
$=9-4x+5x^2+7x^3-3x^3+4x^2-2x+6$	[M1] for correct simplification
$=7x^3-3x^3+5x^2+4x^2-4x-2x+9+6$	
$=4x^3+9x^2-6x+15$	[A1]

(c) Factorize $6ac-21bc+35bd-10ad$. [3]

$6ac-21bc+35bd-10ad=3c(2a-7b)+5d(7b-2a)$	[M1 cao ×2]
$=3c(2a-7b)-5d(2a-7b)$	
$=(3c-5d)(2a-7b)$	[A1]

3 (a) Solve $3x+7(x+2)=4(5-3x)+7$. [3]

$3x+7(x+2)=4(5-3x)+7$	
$3x+7x+14=20-12x+7$	[M1 cao] correct expansion
$10x+12x=27-14$	[M1] collect x terms to one side
$22x=13$	
$x=\frac{13}{22}$	[A1]

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3 (b) Solve $\frac{2}{9}(x-4)-\frac{x-1}{4}=\frac{3}{2}$. [3]

$\frac{2}{9}(x-4)-\frac{x-1}{4}=\frac{3}{2}$

$\frac{8(x-4)-9(x-1)}{36}=\frac{3}{2}$ [M1 cao] common denominator

$2(8x-32-9x+9)=108$ [M1] correct expansion

$16x-64-18x+18=108$

$-2x=108+64-18$

$x=-77$ [A1]

(c) Given that $x=3(y-2z)$, find the value of z when $x = 21$ and $y = 42$. [3]

$x=3(y-2z)$

$21=3(42-2z)$ [M1 cao]correct substitution

$21=126-6z$

$6z=126-21$ [M1 cao]collect z terms to one side

$6z=105$

$z=17\frac{1}{2}$ [A1]

(d) A carpenter needs at least 400 nails to construct a wooden structure. The nails are sold in packets of one dozen. Use inequality to find the minimum number of packets of nails he has to buy. [3]

Let y be the no. of packets of nails.

$12y \geq 400$ [M1 cao]correct inequality

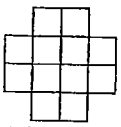
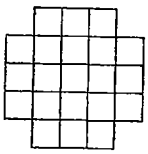
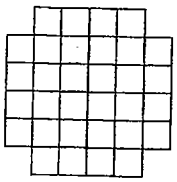
$y \geq \frac{400}{12}$

$y \geq 33\frac{1}{3}$ [M1 cao]

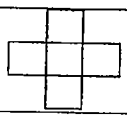
$\therefore$ The minimum no. of packets of nails he has to buy is 34. [A1]

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4 The table below shows a sequence formed by small squares of sides 1cm each.

Figure	Perimeter of Figure (cm)	Area of figure (cm^2)
Figure 1	12	$1^2+1\times4$
 Figure 2	16	$2^2+2\times4$
 Figure 3	20	$3^2+3\times4$
 Figure 4	24	$4^2+4\times4$

(a) Draw Figure 1 on the answer script. [1]
(b) Write down in terms of n, the perimeter of the n^{th} figure. [1]
(c) Hence, find the perimeter of Figure 99. [1]
(d) If the area of the figure is $117cm^2$, find the figure number. [2]

(a) [B1] 

(b) Perimeter of the n^{th} figure = $(4n+8)$ cm [B1]

(c) Perimeter of Figure $99 = (4\times99)+8$
$= 404\ cm$ [B1]

(d) $n^2+4n=117$
$9^2+(4\times9)=117$ [M1 cao]
$\therefore$ Figure no. is 9. [A1]

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5 **(a)** Given that $a = 2, b = -3$ *and* $c = -1$, evaluate

(i) $\frac{a}{b} + \frac{c}{a} + \frac{b}{c}$, [2]

(ii) $b^2 - \frac{4(b+a)-c}{3c+b}$. [2]

(i) $\frac{a}{b} + \frac{c}{a} + \frac{b}{c} = \frac{2}{-3} + \frac{(-1)}{2} + \frac{(-3)}{(-1)}$ [M1 cao]correct substitution

$= -\frac{2}{3} - \frac{1}{2} + 3$

$= -\frac{7}{6} + 3$

$= 1\frac{5}{6}$ [A1]

(ii) $b^2 - \frac{4(b+a)-c}{3c+b} = (-3)^2 - \frac{4(-3+2)-(-1)}{3(-1)+(-3)}$ [M1 cao] correct substitution

$= 9 - \frac{(-4+1)}{(-6)}$

$= 8\frac{1}{2}$ [A1]

(b) **(i)** Express 168 as a product of its prime factors, giving your answer in index notation. [1]

(ii) Hence, find the smallest integer, k, such that $168k$ is a perfect cube. [2]

(i) $168 = 2^3 \times 3 \times 7$ [B1]

(ii) $168k = 2^3 \times 3 \times 7 \times 3^2 \times 7^2$

$\therefore k = 3^2 \times 7^2$ [M1 cao]

$= 441$ [A1]

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6 **(a)** During Teachers' day celebrations, the students' council distributed 315 pens, 420 pencils and 525 bookmarks equally to the teachers of the school. Find the largest possible number of teachers in the school that received the gifts. [3]

$315 = 3^2 \times 5 \times 7$

$420 = 2^2 \times 3 \times 5 \times 7$

$525 = 3 \times 5^2 \times 7$ [M1 cao]Correct for all 3

$HCF(315,420,525) = 3 \times 5 \times 7$ [M1 cao]

$= 105$

$\therefore$ Maximum no. of teachers is 105. [A1]

(b) Three electric toy cars are made to race around an oval track at the same time. Car X completes 1 lap in 110 second, Car Y in 80 seconds while Car Z completes in 90 seconds. How long will it take before the three toy cars are at the starting point together again? [3]

$80 = 2^4 \times 5$

$90 = 2 \times 3^2 \times 5$

$110 = 2 \times 5 \times 11$ [M1 cao]Correct for all 3

$LCM(80,90,110) = 2^4 \times 3^2 \times 5 \times 11$ [M1 cao]

$= 7920$

$\therefore$ The cars will meet again after 7920s. [A1]

or 132 minutes or 2h 12 minutes

7 **(a)** A photocopy machine can print 15 copies per minute.

(i) How many copies can it print in 30 minutes? [1]

(ii) How long does it take to print 25 copies? [1]
(Leave your answers in minutes and seconds)

(i) No. of copies printed in 30 min. $= 30 \times 15$

$= 450$ copies [B1]

(ii) Time taken to print 25 copies $= \frac{25}{15}$

$= 1\frac{2}{3}$ min

$= 1$ minute 40 seconds [B1]

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7(b) A passenger train left Singapore at 0800 and travelled at an average speed of x km/h to Kuala Lumpur which is 360 km away. At 0900, a goods train left Kuala Lumpur for Singapore, travelling at an average speed which was slower than the passenger train by 20km/h. Both trains were running on parallel tracks and they passed each other at 1030.

(i) Write down an expression in terms of x, for the average speed of the goods train. [1]

(ii) Find, an expression in terms of x for the distance traveled by the passenger train just before it passed the goods train. [1]

(iii) Form an equation in terms of x and solve it to find the average speed of the passenger train. [3]

(i) Ave. speed of goods train $= (x-20)$ km/h [B1]

(ii) Distance travelled by passenger train $= (2.5x)$ km [B1]

(iii)
$$2.5x+1.5(x-20)=360 \quad \text{[M1] forming equation}$$
$$2.5x+1.5x-30=360$$
$$4x=390 \quad \text{[M1 cao] collect } x \text{ terms to one side}$$
$$x=97.5$$
$\therefore$ Ave. speed of passenger train is 97.5 km/h. [A1]

(c) **(i)** There were 329 apples in container A. The ratio of apples in container A to container B is 7:3. Find the total number of apples. [1]

(ii) Some apples are transferred from container A to B. Now container B has $\frac{2}{3}$ the number of apples in container A. Find the number of apples that were transferred to container B. [2]

(i)
$$\text{Total no. of apples} = \frac{329\times(7+3)}{7}$$
$$=470 \quad \text{[B1]}$$

(ii)
$$\text{No. of apples in B after transfer} = \frac{2}{2+3}\times 470$$
$$=188 \quad \text{[M1 cao]}$$
$$\text{No. of apples transferred} = 329-(470-188)$$
$$=47 \quad \text{[A1]}$$

End of Paper

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