Teacher: [Circle] PER FON MCL	**Class:**	**Name** [Print clearly]

ACG PARNELL COLLEGE
ACADEMIC COLLEGES GROUP

NOVEMBER EXAMINATIONS 2012

SUBJECT: Year 7 Mathematics

Time allowed: 2 Hours **Total Marks: 180**

READ THESE INSTRUCTIONS FIRST

Answer <u>all</u> questions
The number of marks is given in brackets [ ] at the end of each question or part question.

This is a question and answer booklet. Write your answers in the spaces provided.
You may use a calculator.
SHOW YOUR WORKING AT ALL TIMES.

Do not use staples, paper clips, highlighters, glue or correction fluid.
Write in dark blue or black pen. You may use a pencil for diagrams, graphs or rough working.

Section	Topic	Marks
A	Semester One	50
B	2D and 3D Geometry	30
C	Time	15
D	Statistics	20
E	Patterns (Algebra)	25
F	Probability	10
G	Transformation Geometry	15
H	Problem Solving	15
	Total Marks:	180

This document consists of 19 printed pages and 0 blank pages

Section A: Semester One (50 marks)

Antonio works at Auckland Airport help him get through his first day at work by answering the following questions.

1. Antonio is helping an unaccompanied minor (child travelling alone) with his homework, fill in the gaps with the correct answers.

   a) Write 3649 in expanded form

   3 x 1000 + 6 x 100 + 4 x 10 + 9 (x 1) ✓ [1]

   b) Write $4 \times 10{,}000 + 3 \times 10 + \frac{2}{10} + \frac{5}{100}$ in simple numeral form. 40030.25 ✓ [1]

   c) Write $\frac{4}{5}$ with 35 as the denominator 28/35 ✓ [1]

   d) Work out $\frac{3}{4} + \frac{1}{3}$ $\frac{9}{12} + \frac{4}{12}$ 13/12 ✓ [1]

   or 1 1/12

   e) Consider the number 3056.42

   Give the place value of the 4 tenths or 1/10 ✓ [1]

   Give the value of 3 3000 ✓ [1]

   f) Put the following fractions in **descending** order:

   $\frac{2}{3}, \frac{1}{2}, \frac{1}{7}, \frac{3}{5}, \frac{8}{9}$

   8/9, 2/3, 3/5, 1/2, 1/7 ✓ [1]

   g) Showing full working (using an algorithm) divide 34.6 by 4

   $$\begin{array}{r} 08.65 \\ 4\overline{)34.^{3}6^{2}0} \end{array}$$

   8.65 [2]

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2. The picture to the right shows a section of the aeroplane cabin. Antonio needs to ensure the unusual demands of his travellers are met. Fill out a suitable row for the following customers:

   a) Customer A: "I demand to sit in a row which is a multiple of 4"

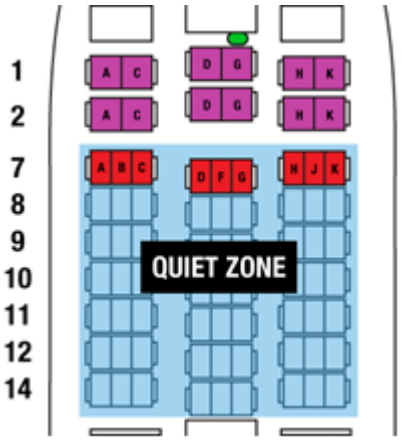
   8, 12 ✓ [1]

   b) Customer B: "I prefer it if I am in a row which is both a prime number and even"

   2 ✓ [1]

   c) Customer C: "I would like to sit in a row which is a factor of 28"

   14, 2, 1, 7 ✓ [1]



(12)

3. A couple is at the check-in when the computers fail – Antonio needs to work out the cost of their flight. Each ticket is $238.60 and the couple also receive a $50 discount because they are on honeymoon. Showing all of your working (ie. using algorithms) help Antonio work out the cost of their flight.

$$\begin{array}{r} {}^{1}2{}^{1}38.60 \\ \times \quad 2 \\ \hline 477.20 \end{array} \quad \text{or} \quad \begin{array}{r} {}^{1}2{}^{1}38.60 \\ + \ 238.60 \\ \hline 477.20 \end{array} \qquad \begin{array}{r} 477.20 \\ - \ 50.00 \\ \hline 427.20 \end{array}$$

✓

Answer $427.20 ✓ [2]

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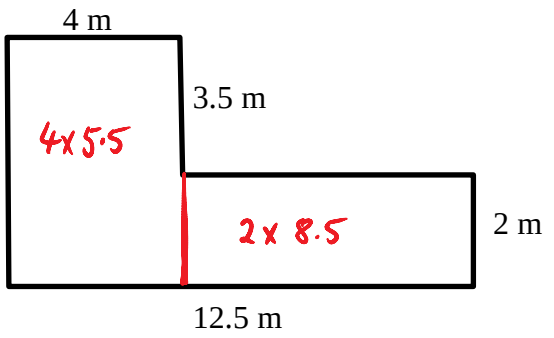
4. a) The Koru Lounge is being re-carpeted - by finding the area of the lounge below determine the amount of carpet Antonio will need to order.



22m² ✓ + 17m² ✓

(OR 25m² ✓ + 14m² ✓)

Answer 39 m² ✓ [3]

b) The carpet costs $52.50 per metre^2, using one figure approximation give an *estimate* of the total cost of the carpet as well as the actual cost of the carpet.

40 x 50 ✓ correct approximation from their (4)

Estimate $2000 ✓ [2]

Answer $2047.5 ✓ [1]

c) The skirting board around the perimeter of the Koru Lounge is also being replaced, determine the length of the board required.

4 + 3.5 + 8.5 + 2 + 12.5 + 5.5 (o.e)

✓ ✓ ✓

Answer 36 m [3]

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5. One of Antonio's staff members informs him that $\frac{3}{8}$ of the seats on a plane are occupied by females and $\frac{2}{5}$ of the seats are occupied by males. What fraction of the seats on the plane are **empty**?

$$\frac{3}{8} + \frac{2}{5} = \frac{15}{40} + \frac{16}{40} = \frac{31}{40}$$

✓

Answer 9/40 ✓ [2]

13

6. One of Antonio's staff members is confused about some definitions, help Antonio explain the following words by providing the **mathematical** definitions of the words below: (You may wish to give an example as well). [4]

a) Capacity: (The *capacity* of a plane is 320 passengers)

The amount something can hold, measured in Litres etc ✓

b) Equivalent: (There are *equivalent* seats available on a different aircraft)

Has the same value eg $\frac{1}{2}$ is equivalent to $\frac{2}{4}$

c) Round: (The price of your tickets has been *rounded*)

To add or subtract to make a number whole or to estimate a number eg 38.6 rounded to the nearest whole number is 40

d) Composite Number: (The number of people on the plane was a *composite* number)

A composite number has more than one factor

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7. One of the passengers travelling from Auckland to Wellington is from America and has lots of questions for Antonio, study the map shown and answer the questions below.

a) How far is it from Auckland to Wellington?

5cm ✓

Answer 500km ✓ [2]

b) Is Mount Taranaki East or West when I fly past it? (assuming a direct flight path from Auckland to Wellington)

Answer West ✓ [1]

c) What direction is Taupo from Auckland?

Answer SE ✓ [1]

d) To help Antonio remember for next time, write the scale of the map in the form 1: _____

1 : 100 km

100 x 1000 x 100 ✓

1 mark if leaves answer as 1 : 100km or 1 : 10,000 m

Answer **1:** 10000000 ✓ [2]

e) For this particular flight the plane must always be within 170 km of Auckland, Taupo or Wellington in case it needs to make an emergency landing. Draw on top of the map the locus of where the plane can fly. [2]

✓ circles ✓ circles with radius 1.7 cm

12

8. Antonio is making an easy reference chart for his check-in staff who frequently need to change between fractions, decimals and percentages. Fill in the missing numbers in his chart below. [6]

Percentage	Decimal	Fraction (simplest form)
30%	**a)** 0.3 ✓	**b)** $\frac{3}{10}$ ✓
c) 60% ✓	**d)** 0.6 ✓	$\frac{3}{5}$
e) 45% ✓	0.45	**f)** $\frac{9}{20}$ ✓

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9. Airlines have strict rules on the size of the carry-on luggage.
   a) Study the information below to determine the **volume** of luggage allowed.

"For Jet Star services baggage should be no more than 57cm (width), 37cm (height) and 24cm (depth)."

57 x 37 x 24
✓

✓ ✓
Answer 50616 cm^3 [3]

   b) Air New Zealand has a slightly different requirement:

"Carry-on luggage must have maximum total dimensions (length + width + height) of 118cm"

Antonio comes across a briefcase which measures 60 cm (width) and 11 cm (height) what must its other dimension be in order to fit the requirements? (must have correct unit)

60 + 11 = 71 ✓
118 - 71 = 47

✓
Answer 47 cm [2]

   c) Will the volume of the carry-on luggage always be the same if the total dimensions are 118 cm? (show some working to justify your answer)

No because the volume for a) was 50616 cm^3 ✓
whereas volume for b) was 31020 cm^3
& their dimensions added to 118 cm

Answer No ✓ [2]

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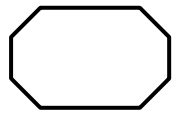
(13)

Section B: 2D and 3D Geometry (30 marks)

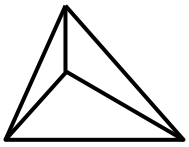
12. Write down the name of the following polygons and solids [6]

a) 

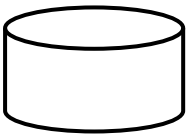
Octagon ✓

b) 

Right angle triangle ✓

c) 

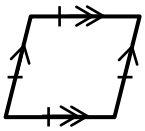
Triangular pyramid or Tetrahedron ✓

d) 

Cylinder ✓

e) 

Trapezium ✓

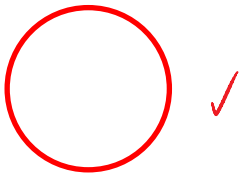
f) 

Rhombus ✓

g) Write down the number of edges (E), faces (F) and vertices (V) for solid (c): [1]

E 6 F 4 V 4 ✓

h) Draw the horizontal and vertical cross-section of solid (d) [2]

Horizontal:  ✓

Vertical:  ✓

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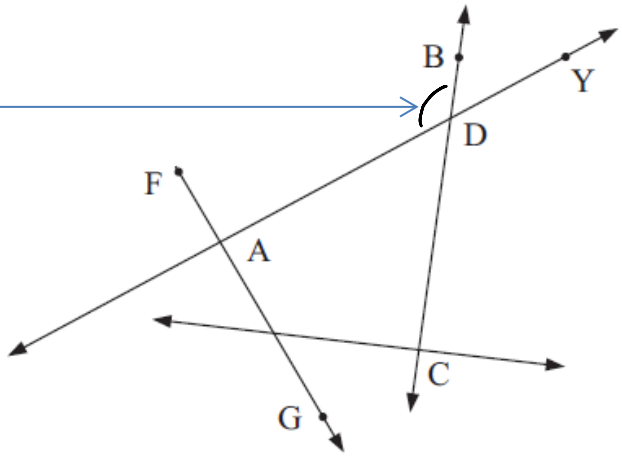
13. Answer the following questions based on the picture shown:



a) Measure the angle YDC

126° ± 1° [1]

b) Name a line passing through A

(must have arrows) $\overleftrightarrow{AY}$ or $\overleftrightarrow{AD}$ [1]

c) Name the intersection of $\overleftrightarrow{BC}$ and $\overleftrightarrow{AY}$

D [1]

d) Name the angle indicated ∠BDA or $\hat{A}DB$ [1]

e) Name a ray shown in the diagram $\overrightarrow{FG}$ [1]

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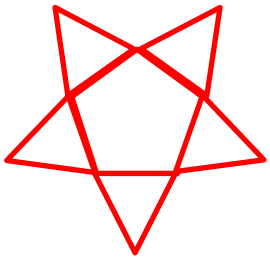
14. Neatly draw the net of a pentagonal-based pyramid. (Use your ruler) [2]



√√

lose a mark if not ruled

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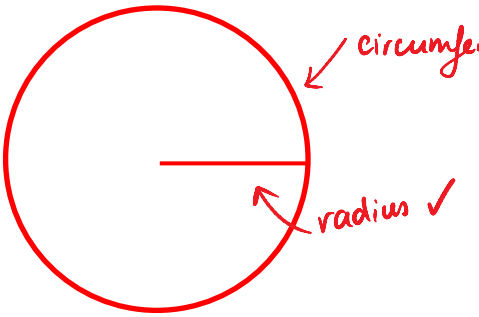
15. Construct (use a compass to draw) a circle with diameter 4 cm below. Label the circumference and the radius. [4]



circumference ✓

radius ✓

✓ circle

✓ correct diameter of 4cm

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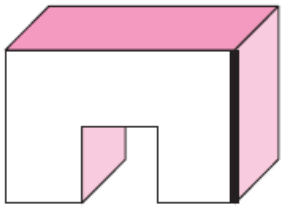
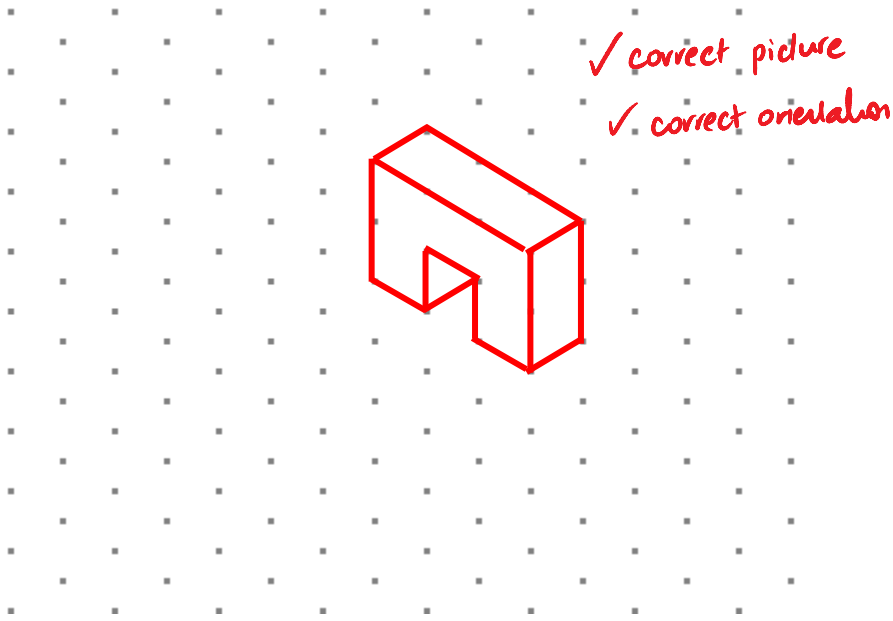
16. a) Draw an isometric projection of the following solid on the isometric grid below, the darker edge should be closest to you. [2]

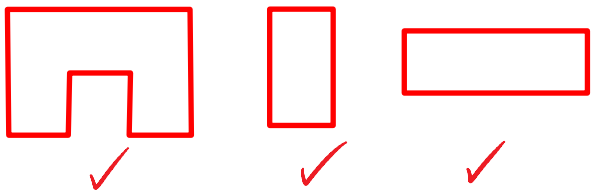




✓ correct picture

✓ correct orientation

b) Draw the front, side and top view of the solid [3]



✓ ✓ ✓

11

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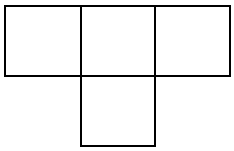
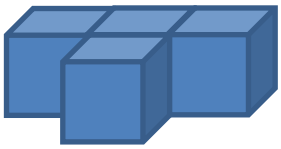
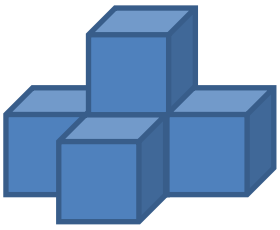
17. Draw **two** solids, using an oblique projection, which would give the top view shown below. [2]







✓

or any others'

✓

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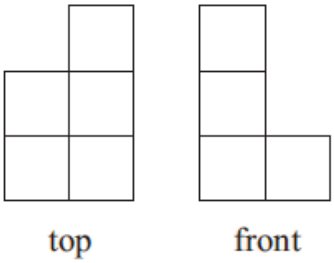
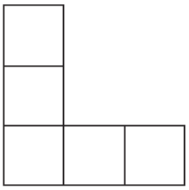
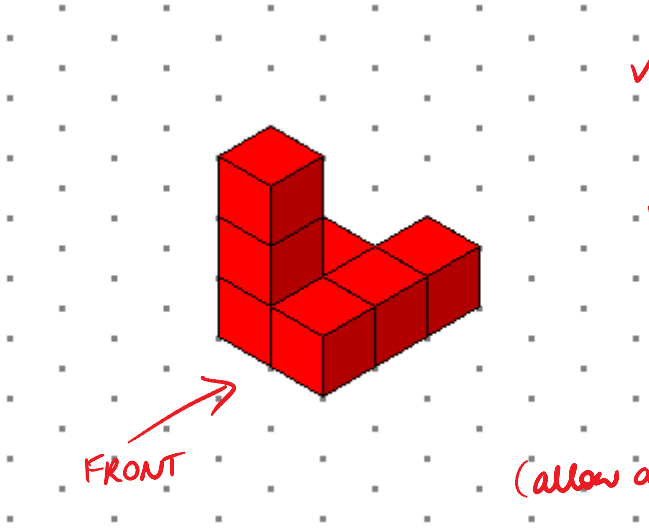
18. Draw the 3-dimensional solid which would have the following views on the isometric paper provided. [3]







✓correct from 1 view

✓✓correct from 2 views

✓✓✓ all correct

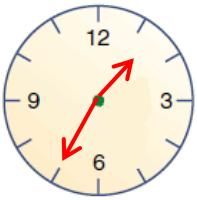
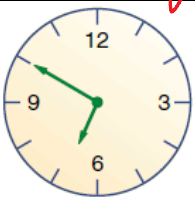
(allow any orientation)

Spare isometric paper if you need:

⑤

Section C: Time (15 marks)

19. Fill in the table (a – f) with the correct times, for question (c) you will need to draw in the hands of the clock. [6]

		12 – hour time	24 – hour time
	 AM	(a) 2:25 am ✓	(b) 02:25 hours ✓
(c)	 PM ✓	(d) 1:35 pm ✓	13:35 hours
	 PM	(e) 6:50 pm ✓	(f) 18:50 hours ✓

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20. Fill in the gaps of Sarah's trip to Europe. [4]

Sarah had to get to the airport by 0320 hours in order to check-in for her flight to Germany. It took 45 minutes in the car so she made sure she left by 02:35 ✓.

The flight took almost 24 hours! She arrived in Frankfurt, Germany at 18:40 hours on Saturday (german time). New Zealand is 11 hours ahead of Germany, so she decided not to ring home as it was only 05.40 hours ✓ on Sunday ✓ morning.

(allow if no hours)

The next morning she took a train to Paris, the train left at 9:45 am and arrived at 2:07 pm, it was a very fast train as the trip only took 262 ✓ minutes!

or 4 hours & 22 minutes

10

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21. This is part of the Air New Zealand timetable for flights from Hamilton to Christchurch: [5]

Days	Dep	Arr	Flight	A/C	Transfer at	to	Dep	A/C
DX7	7.00 am	9.05 am	NZ641	737				
7	7.30 am	9.45 am	NZ641	737	WLG	NZ407	9.00 am	737
DX67	10.00 am	12.45 pm	NZ8529	SF3	WLG	NZ421	12 noon	737
6	10.35 am	1.00 pm	NZ2208	EMB	AKL	NZ517	11.40 am	737
7	11.25 am	1.45 pm	NZ8501	SF3	WLG	NZ427	1.00 pm	737
DX67	1.00 pm	4.00 pm	NZ8535	SF3	WLG	NZ447	3.15 pm	737
7	2.30 pm	5.00 pm	NZ2206	SWM	AKL	NZ539	3.40 pm	737
6	4.15 pm	7.30 pm	NZ5015	AT7	WLG	NZ5041	6.35 pm	AT7
DX6	4.15 pm	6.50 pm	NZ5015	AT7				
DX67	5.50 pm	8.30 pm	NZ8537	SF3	WLG	NZ463	7.45 pm	737
7	6.15 pm	9.25 pm	NZ8513	SF3	WLG	NZ467	8.40 pm	737
D = daily, X = except, 1 = Mon, 2 = Tue, 3 = Wed, 4 = Thu, 5 = Fri, 6 = Sat, 7 = Sun								

a) When does flight NZ8535 leave Hamilton? 1pm ✓

b) Mr Fong is booked on flight NZ8513. He has been told to arrive at the airport half an hour before departure time. When should he arrive at the airport? 5:45 pm ✓ (must have pm)

c) Which day of the week has the fewest flights? Saturday ✓

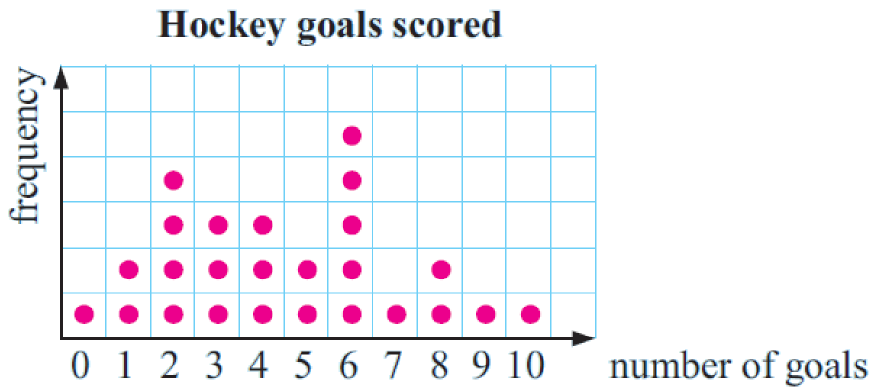
d) When does the last flight on Saturday reach Christchurch? 7:30 pm ✓

e) Use the table to work out the flight time for a 737 from Wellington to Christchurch. 45 minutes ✓

5

Section D: Statistics (20 marks)

22. The dot plot shows the number of goals scored by an exceptional hockey player over the course of a season



a) How many times did the player score 5 or more goals? 12 [1]

b) How many games did she play in total? 25 [1]

c) For what percentage of the games did she score 3 or less goals?

10 ÷ 25 × 100

40% [2]

---

23. The ages of the employees of International Sports Coaching Clinics are given below:

23, 18, 29, 31, 25, 24, 17, 33, 22, 20, 21, 25, 16, 34
21, 23, 22, 27, 28, 30, 28, 19, 20, 22, 22, 21, 27, 26

a) Calculate the mean age of the employees, round your answer to the nearest whole number.

674 ÷ 28

24 [2]

b) In the space provided draw a stem and leaf plot of the data [3]

1 | 8 7 6 9
2 | 3 9 5 4 2 0 1 5 1 3 2 7 8 8 0 2 2 1 7 6
3 | 1 3 4 0

✓ correct stem

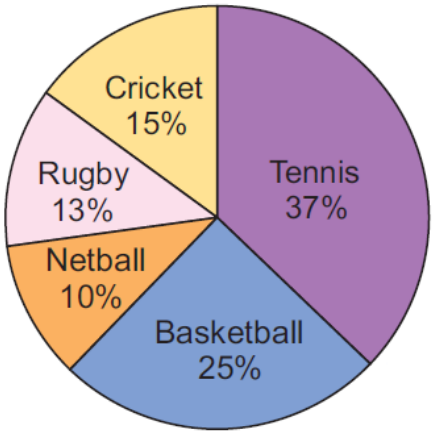
✓ almost correct leaves (allow 2 omissions)

✓ correct leaves

9

24. The pie chart shows the results of a survey of 120 Year 7 students. All students were asked the question: "*What is your favourite sport*?"

Use the chart to determine:



a) The most popular sport

Tennis ✓ [1]

b) The number of students whose favourite sport was basketball

120 ÷ 100 x 25 ✓

30 ✓ [2]

c) The number of students who did **not** choose cricket as their favourite sport.

120 ÷ 100 x 85 ✓

102 ✓ [2]

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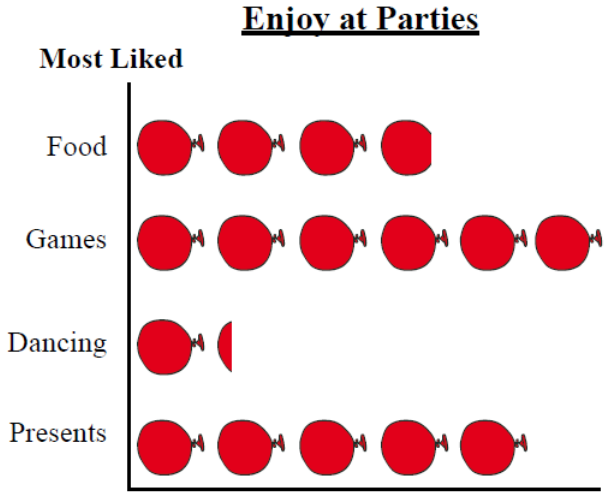
25. The following pictograph shows what a group of friends said they like most about going to parties.

a) The pictograph is missing some information from the key, if 30 kids said they liked games fill in the missing information. [1]

Key: ● = 5 kids ✓



b) How many friends liked dancing?

6 - 7 ✓ [1]

c) How many friends were surveyed?

allow follow though

80 → 82 ✓ [1]

d) If this information was extended to the whole school (800 students) how many would you expect to enjoy dancing most?

(Their b/c → 800)

6 x 10 ✓

60 ✓ [2]

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26. Circle the **best** mathematical definition for the term random: [1]

A. Having no specific pattern, purpose, or objective.

B. When someone says something completely out of the blue that has nothing to do with anything you were talking about.

C. Chosen without regard to any characteristics of the individual members of the population so that each has an equal chance of being selected.

11

Section E: Patterns and Algebra (25 marks)

27. Write down the next two numbers in each of these patterns:

(a) 1, 6, 11, 16, 21, 26 ✓ [1]

(b) 3, 12, 48, 192, 768 ✓ [1]

(c) 0, 1, 1, 2, 3, 5, 8, 13 ✓ ✓ [2]

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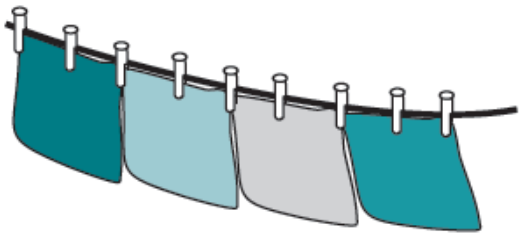
28. Tea towels are hung out to dry on a clothesline. Each tea towel takes three pegs. The two pegs at either end can be shared with the tea towel next to it.



a) Use the diagram to determine how many pegs needed for four tea towels.

9 ✓ [1]

b) A formula that gives the number of pegs for n tea towels is: $p = 2 \times n + 1$

Use the formula to work out the number of pegs needed for:

(i) 1 tea towel 3 ✓ [1]

(ii) 15 tea towels 31 ✓ [1]

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29. Fill in the gaps for the following equations: [4]

a)

$$5 \times [\mathbf{13}] = 65$$

b)

$$[\mathbf{21}] \div 3 = 7$$

c)

$$[\mathbf{11}] \times 11 = 121$$

e)

$$[\mathbf{17}] - 12 = 5$$

---

30. Write the following rules as algebraic formulas. Use the bold letters in each one as your variables.

(a) The ***n***umber of people on an aircraft is equal to the number of ***c***rew plus the number of ***p***assengers

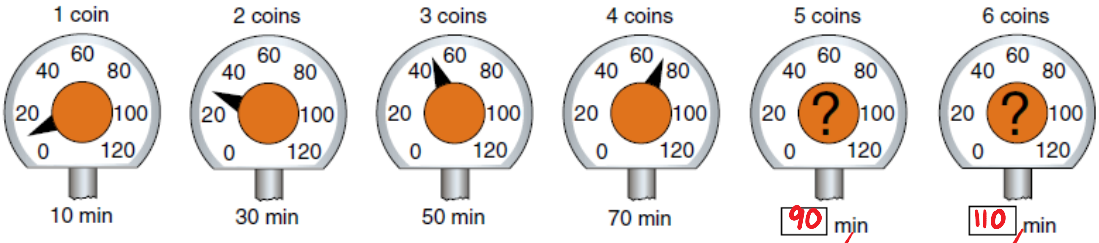
$n = c + p$ ✓ [1]

(b) A ***s***on's age is his ***f***ather's age minus 24.

$S = f - 24$ ✓

13 [1]

31. A parking meter takes only $1 coins. The pictures below show what happens as Tiffany puts in her coins.

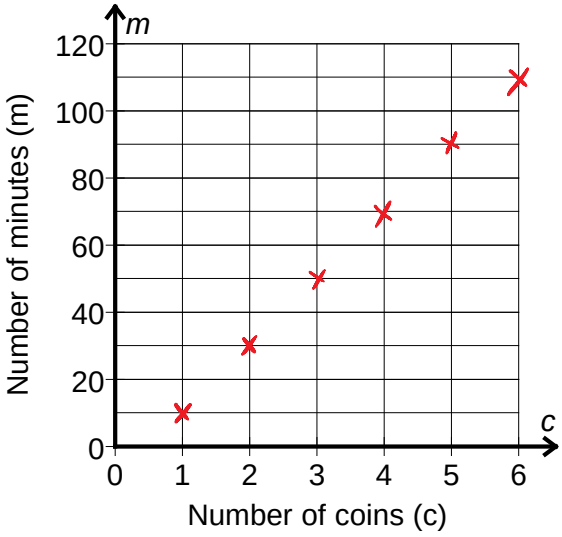


a) Fill in the number of minutes below the pictures for 5 and 6 coins [2]

b) Write an equation for the number of minutes:

Minutes = 20 x c − 10 [2]

c) Plot the pattern on the axes below [2]



✓ for 4 correct points

✓✓ all correct (cannot be joined)

d) Calculate the number of coins that would be required for 230 minutes parking.

230 + 10 = 240 ✓

240 ÷ 20

12 coins [2]

---

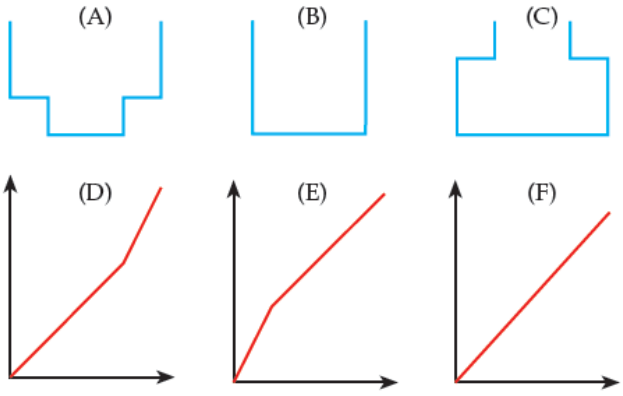
32. Each of the containers A – C is filled with water at a steady rate. Match each one with a graph D – F, showing the relationship between the height of water and the time taken to fill the container.

a) [3]

A - E ✓

B - F ✓

C - D ✓



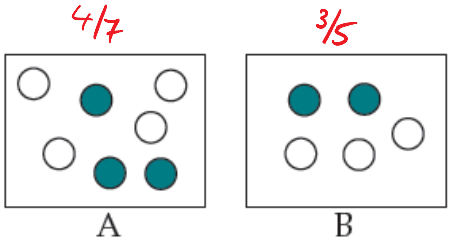
b) Which container (A, B or C) contains the least amount of water?

B ✓ [1]

12

Section F: Probability (10 marks)

33. Box A and Box B each contain some grey and some white balls, as shown in the diagram.



a) You want to choose a white ball, but you are not allowed to look as you choose. Which box should you draw from? Explain your choice.

B ✓ - because the chance of getting a white ball is higer (3/5 > 4/7) [2]

b) The two boxes of balls are joined together, what is the probability of choosing a white ball?

7/12 [1]

---

34. One card is to be chosen at random from these six cards. Put these events in order from *least likely* to *most likely*.

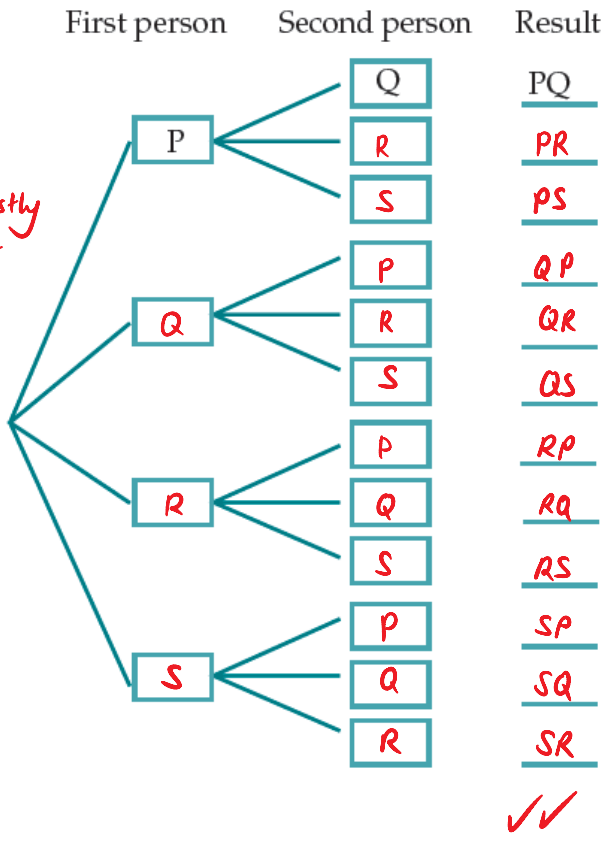
A The card will be a 4 2/6
B The card will be less than 10 5/6
C The card will be a 7 1/6
D The card will be greater than 4 3/6

C, A, D, B ✓✓ [2]

1 mark if 3 of the probabilities are accurately written down or 1 out of place

---

35. Four students – Paul, Quentin (both boys), Rachel and Sally (both girls) – have been given two tickets to a rock concert. They have to decide who will get to go to the concert. The tree diagram shows the different possibilities.



a) Complete the tree diagram [2] ✓ if mostly correct

b) How many possibilities are there?

12 ✓ [1]

c) What is the probability that Rachel gets to go?

6/12 ✓ [1]

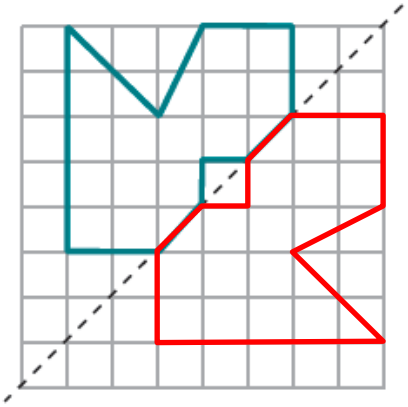
d) What is the probability that both girls get to go?

2/12 ✓ [1]

Section G: Transformation Geometry (15 marks)

36. Complete the following transformations on the diagrams below [8]

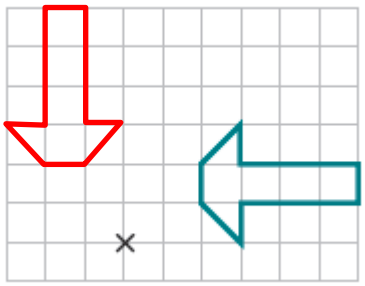
a) Reflect across the mirror line shown



✓ minor mistake

✓✓ all correct

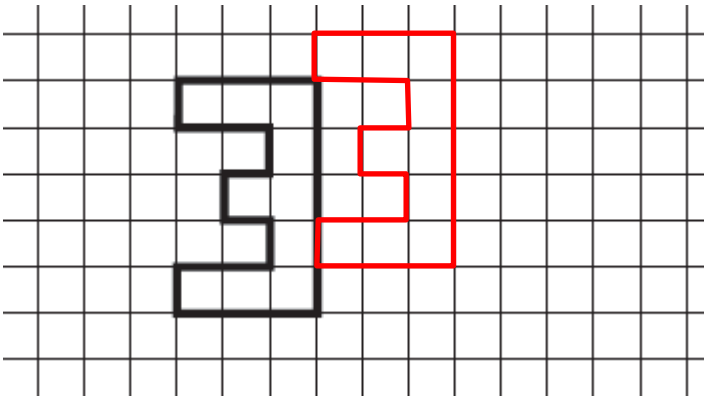
b) Rotate 90° anti-clockwise about X



✓ correct position

✓ correct shape

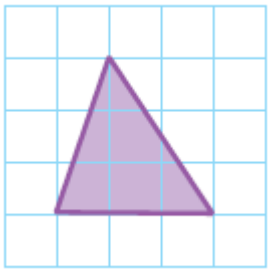
c) Translate right 3 and up 1



✓ correct x position

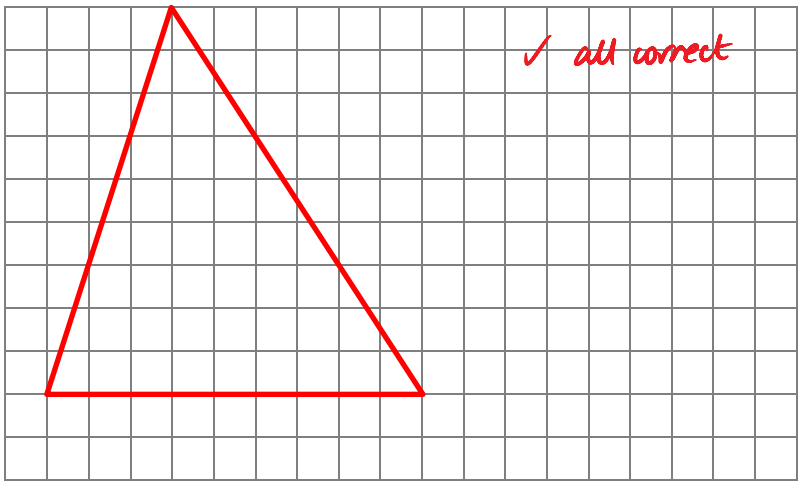
✓ correct y position

d) Enlarge by scale factor 3

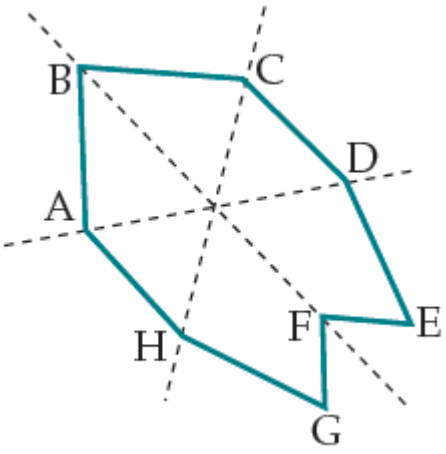


✓ correct length of base

✓ all correct



37. Write down the names (eg. 'AB') of all the lines of symmetry in the following shape.

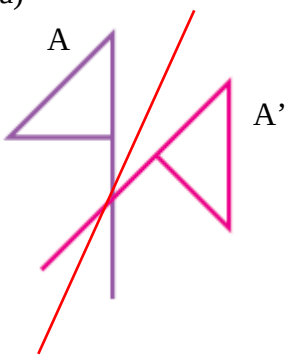


BF ✓ _____ [1]

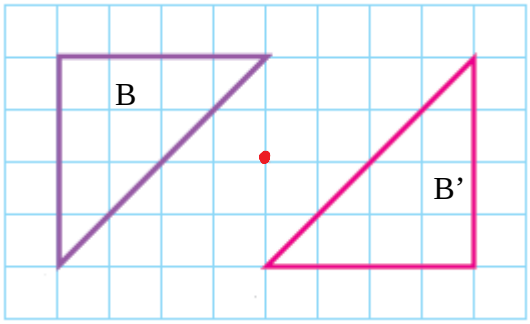
---

38. Describe the following transformations in full.
For reflections, be sure to draw in the mirror line.
For rotations, be sure to draw in the centre of rotation. [5]

a)



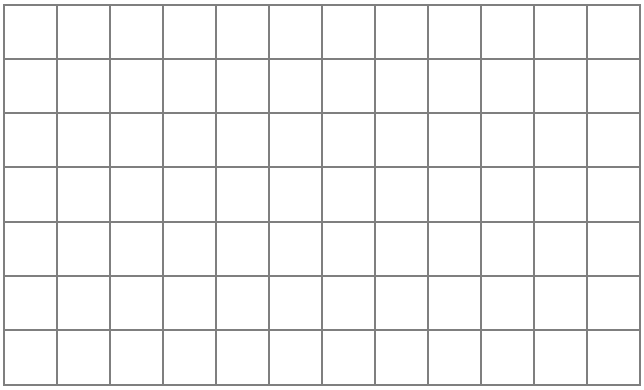
b)

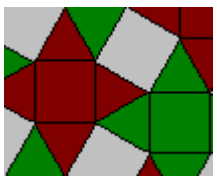


a) Reflection ✓ - across mirror line ✓ drawn

b) Rotation ✓ - about centre ✓ drawn, 180° clockwise ✓

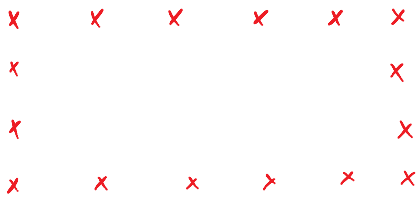
39. Copy the tessellation pattern on the grid provided – you must fill up the majority of the grid. [1]





Section H: Problem Solving (15 marks)

40. Hope's mum baked a caked for Hope's birthday. It is in the shape of a rectangle 10 inches long and 6 inches wide. If she starts at one corner and puts a candle every 2 inches, how many candles will fit around the edge of the cake?



16 ✓ [1]

---

41. A subway train left downtown with 121 passengers aboard. At the first stop, 1 person got off. At the second stop 3 people got off. At the third stop, 5 people got off. If this pattern continues,
How many people will get off at the 7th stop?

1, 3, 5, 7, 9, 11,

13 people ✓ [1]

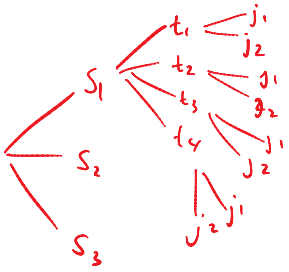
How many stops will the train have made when all the passengers are off?'

1, 4, 9, 16, 25 ✓

11th stop ✓ [2]

---

42. Carleton bought 3 shorts, 4 t-shirts and 2 jumpers to wear as different outfits. How many different combinations can he make that include a pair of shorts, a t-shirt and a jumper?



✓ any reasonable working either list or diagram

8 x 3

24 ✓ [2]

---

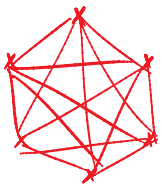
43. Today is the teacher's birthday. The teacher said: "If you multiply my age by 3, then subtract 20, the result is 100." How old is the teacher?

100 + 20 ÷ 3

40 [1]

---

44. In the Land of Pi, there are six cities arranged in a circle. Each city is connected to every other city by a straight road. How many roads are there?



5 + 4 + 3 + 2 + 1
✓

15 ✓ [2]

45. From the clues below, figure out what five numbers I am thinking of:
    1) All the numbers are odd
    2) All the numbers are two-digit numbers
    3) The numbers add up to 97
    4) None of the numbers are the same
    5) The largest number is 25
    6) The second-largest number is 4 more than the third –largest number

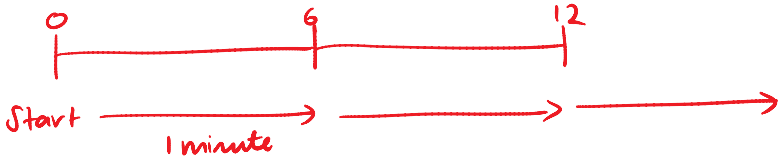
13 , 17 , 19 , 23 , 25

✓ if fulfills 4 criteria
✓✓ all correct

_____ [2]

---

46. An inchworm that is 6 inches long travels at a rate of 6 inches per minute. How long does it take it to crawl completely across a piece of paper that is 12 inches long?

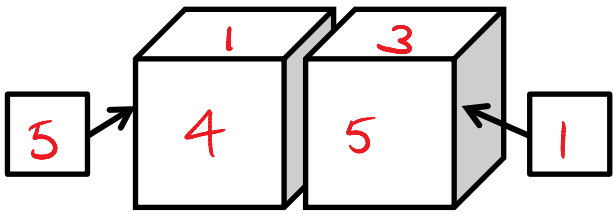


✓ diagram or good working

3 minutes ✓ [2]

---

47. Two dice are placed side by side. From the front, the dice show a sum of nine. On top , the dice show a sum of four. The sum of the right and left ends is six. Draw the dots on the plain dice below to show how they are positioned. (Opposite sides of a die always add to 7) [2]



✓ fulfills requirements but positions of numbers are impossible
✓✓ all correct
