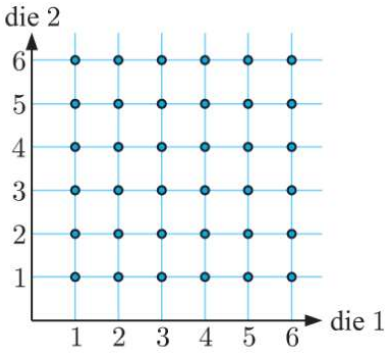
IB Application & Interpretation SL
Summer 2025

Maximum marks will be given for correct answers. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. Write your answers in the answer boxes provided. Solutions found from a graphic display calculator should be supported by suitable working, for example, if graphs are used to find a solution, you should sketch these parts of your answer. **Write your final answers exactly or to 3 significant figures unless otherwise stated.**

1. 36 different possible results from rolling two dice are illustrated.
   (a) Find the probability of rolling:
      i) two 4's
      ii) a 3 or a 4 (or both)
      iii) at least one 2
      iv. no ones
   (b) Find the probability of rolling an even number.
   (c) Find the probability of rolling 2 same numbers.



Working:	*Answers:* (a) i ..... ii ..... iii ..... iv ..... (b) ..... (c) .....

2. Alessandra starts a three-week fitness program that requires her to walk at a fast pace over a distance which increases each day. The first day, a Monday, she walks a distance of 200 m. On Friday, she walks a distance of 360 m. The distance she walks increases by a constant amount d m every day.

(a) Write down the value of d.
(b)Calculate the distance Alessandra will walk on the second Sunday after the start of her program.
(c) Find the total distance Alessandra will have walked at the end of the three-week fitness program.

Working:	*Answers:* (a) ..... (b) ..... (c) .....

3. A sample of adults in a suburb was surveyed about their current employment status and their level of education. The results are summarized in the table.

	Employed	*Unemployed*
Attended university	225	7
Did not attend university	197	18

(a) Estimate the probability the next randomly chosen adult attended university and is unemployed
(b) Estimate the probability the next randomly chosen adult is unemployed or attended university
(c) A randomly chosen adult is found to be unemployed. Estimate the probability he or she attended university.

Working:

Answers:
(a) .....
(b) .....
(c) .....

4. Sally has 30 weeks of training before her next sporting event. In the first week she trains for 45 minutes. The lengths of time she trains every week form an arithmetic sequence. Each week she trains four minutes longer than in the previous week.

(a) How long will Sally train in the fourteenth week?
(b) After which week will Sally be training longer than two hours?
(c) How long will she train in the final week before the sporting event?

Working:

Answers:
(a) .....
(b) .....
(c) .....

5. The following table shows the distances (in metres) thrown by ten athletes who participated in both a javelin and a discus competition.

Javelin, x (m)	54.5	33.7	50.6	61.9	49.3	45.9	38	46.1	52.8	62
Discus, y (m)	44.8	37.12	51.76	62.64	34.08	26.08	38.64	31.68	48.64	62.8

(a) Find the equation of the regression line of y on x.
(b) Find the linear correlation coefficient, r, of the data.
(c) Comment on the value of r.
(d) An 11th athlete throws in Javelin competition at 55.6m. Using the equation of the regression line, estimate the throw of Discus in meters.

Working:	*Answers:*
	(a) .....
	(b) .....
	(c) .....
	.....
	(d) .....

6. The histogram shows the weights of 40 Honeydew Melons, each measured correct to the nearest kg.

(a) [2] Write down the modal weight of the melons.
(b) [2] Find the median weight of the melons.
The lower quartile is 3 kg.
(c) Calculate
(i) the upper quartile;
(ii) the interquartile range.

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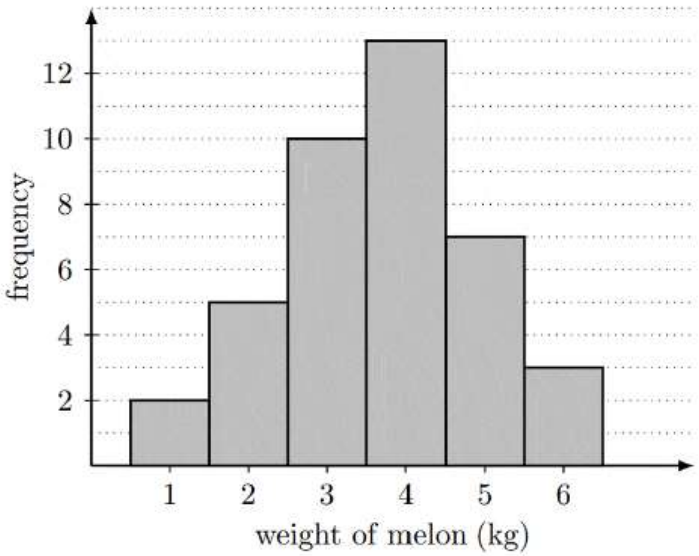
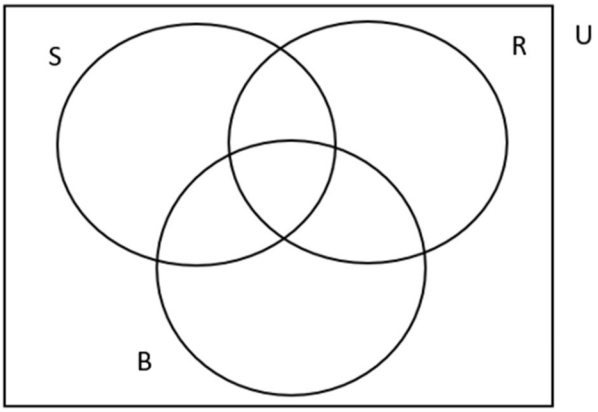


7. 125 sports fans were interviewed and asked what types of sport they have been to in the last year from a choice of soccer (S), rugby (R) or baseball (B).

74 had been to soccer
36 had been to rugby
66 had been to baseball
20 had been to soccer and rugby
27 had been to soccer and baseball
24 had been to rugby and baseball
15 had been to all three types of sport



(a) Draw a Venn diagram to show the above information.
(b) Find the number of sports fans who had been to
i. baseball only;
ii. both rugby and baseball but not by soccer;
iii. at least two types of sport;
iv. none of the three types of sport.

A sports fan is selected at random from those who were interviewed.
(c) Find the probability that the sports fan had been to only one type of sport in the last year.

8. An ice cube was dropped into a cup of warm water. The weight of the ice cube, W, in grams, reduces as the ice cube dissolves in the water. The weight can be modelled by the following function, $W(t)$, where t is the time in seconds after the dissolving starts.

$$W(t) = 28(0.98)^t, \quad t \geq 0$$

(a) Find
i) the initial weight of the ice cube.
ii) the weight of the ice cube after 5 seconds.
(b) Calculate the weight of the ice cube remaining after one minute.
(c) Calculate the number of seconds when the ice cube weights less than 10 grams.

9. Rosetta has bought a new Russian language phrase-book. She has decided to learn some new Russian words every week. In the first week she learned 10 new words. She learned 19 new words in the second week and 28 new words in the third week. The number of new Russian words Rosetta learns each week forms an arithmetic sequence.

(a) How many new words will Rosetta learn in the fourth week?
(b) How many new words will Rosetta learn in the eleventh week?
(c) During which week will Rosetta learn 181 new words?

Working:

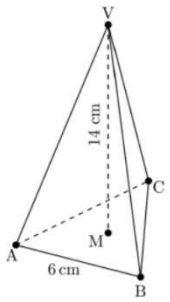
Answers:

(a) .....

(b) .....

(c) .....

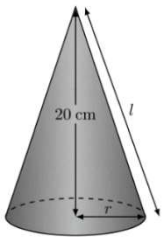
10. A right pyramid has an apex at point V and base, ABC, in the shape of an equilateral triangle. A side length of the base, AB, is 6 cm and the vertical height of the pyramid, VM, is 14 cm.



(a) Calculate the length of VA.
(b) Calculate the volume of the pyramid.

Working:

11. A birthday party cap is made in the form of a right cylinder cone that has a volume of 950 cubic centimeters and vertical height of 20 cm.



(a) Find the radius, r, of the circular base of the cone.

(b) Find the slant height, *l*, of the cone.

(c) Find the curved surface area of the cone.

Working:

Answers:

(a).....

(b).....

(c).....

12. After solving a problem, Marielys has an answer of $z = 0.19$ to two significant figures.

a. State the upper bound and lower bound of the z.
The exact answer was 0.1957428

b. State the value of z given correct to **3 decimal places.**

c. Write down your answer to part (b) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

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13. Given $p = x - \frac{\sqrt{y}}{z}$, $x = 1.775$, $y = 1.44$ and $z = 48$,

(a) Calculate the value of p.

Aliena, **first** writes x, y and z correct to one significant figure and **then** uses these values to estimate the value of p.

b) (i) Write down x, y and z each correct to one significant figure.
(ii) Write down Aliena's estimate of the value of p.

(c) Calculate the percentage error in Aliena's estimate of the value of p.

14. Ashley was given the question. Given that $z = \frac{10\sin(\alpha)}{3x+y}$, where $\alpha = 30°$, $x = 6$ and $y = 46$.

a. Find the **exact** value of z.
b. Write your answer to part (a) correct to 2 decimal places;
c. Write the upper and lower bound of your answer to **part b**.

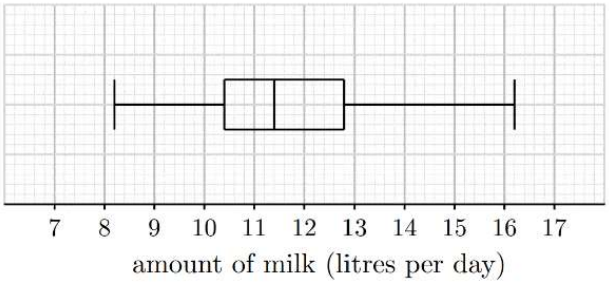
15. Peter owns a diary farm in New Plymouth, New Zealand, where hundreds of cows are bred for milk. In an effort of evaluating the cows productivity, he recorded the amount of milk that the cows produce over several days. The following box-and-whisker diagram represents the summary of the data.

(a) Write down the median amount of milk that a diary cow produces per day at his farm.

(b) Write down the lower and upper quartiles.

(c) Find the interquartile range.

The amount of milk that these cows produce each day is known as being normally distributed.



(d) Find the lowest amount of milk that a cow can produce and still not be considered an outlier.

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16.The table shows the heights, in cm, of students in a class.

Height, x in cm	**Frequency**
$150 \leq x < 160$	10
$160 \leq x < 170$	12
$170 \leq x < 180$	4
$180 \leq x < 190$	5
$190 \leq x < 200$	2

(a) State the number of students in the class

(b) Determine an estimate for the mean height of the students, **correct to the nearest cm.**

(c) Write down the modal class.

(d) State whether the data is discrete or continuous.

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17. The Osaka Tigers basketball team play in a multilevel stadium. The most expensive tickets are in the first row. The ticket price, in Yen (¥), for each row forms an arithmetic sequence. Prices for the first three rows are shown in the following table.

Ticket pricing per game	
1st row	6800 Yen
2nd row	6550 Yen
3rd row	6300 Yen

(a) Write down the value of the common difference, d

(b) Calculate the price of a ticket in the 16th row.

(c) Find the total cost of buying 2 tickets in each of the first 16 rows.

Working:

Answers:

(a).....

(b).....

(c).....

18. At the end of a school day, the Headmaster conducted a survey asking students in how many classes

Number of classes in which the students used the internet	0	1	2	3	4	5	6
Number of students	20	24	30	k	10	3	1

(a) State whether the data is discrete or continuous.

(b) The mean number of classes in which a student used the internet is 2. Find the value of k .

(c) It was not possible to ask every person in the school, so the Headmaster arranged the student names in alphabetical order and then asked every 10th person on the list.
Identify the sampling technique used in the survey.

Working:

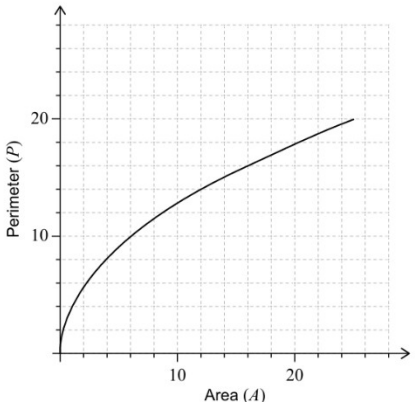
Answers:

(a).....

(b).....

(c).....

19. The perimeter of a given square P can be represented by the function $P(A) = 4\sqrt{A}$, $A \geq 0$, where A is the area of the square. The graph of the function P is shown for $0 \leq A \leq 25$.



(a) Write down the value of $P(25)$.

The range of $P(A)$ is $0 \leq P(A) \leq n$.

(b) Hence write down the value of n.

(c) On the axes above, draw the graph of the inverse function, P^{-1}.

(d) In the context of the question, explain the meaning of $P^{-1}(8) = 4$.

Working:

Answers:

(a).....

(b).....

(c).....

(d) .....

20. A professor investigated the migration season of the Bulbul bird from their natural wetlands to a warmer climate. He found that during the migration season their population, P, could be modeled by $P = 1350 + 400(1.25)^{-t}$, $t \geq 0$, where t is the number of days since the start of the migration season.

(a) Find the population of the Bulbul birds,
   (i) at the start of the migration season.
   (ii) in the wetlands after 5 days.

(b) Calculate the time taken for the population to decrease below 1400.

(c) According to this model, find the smallest possible population of Bulbul birds during the migration season.

Working:

Answers:

(a).....

(b).....

(c).....

21. The intensity level of sound, L measured in decibels (dB), is a function of the sound intensity, S watts per square metre ($\mathrm{W\,m^{-2}}$). The intensity level is given by the following formula.

$$L = 10\log_{10}(S \times 10^{12}),\ S \geq 0$$

(a) An orchestra has a sound intensity of $6.4 \times 10^{-3}\,\mathrm{W\,m^{-2}}$. Calculate the intensity level, L of the orchestra.

(b) A rock concert has an intensity level of $112\,\mathrm{dB}$. Find the sound intensity, S.

Working:

Answers:

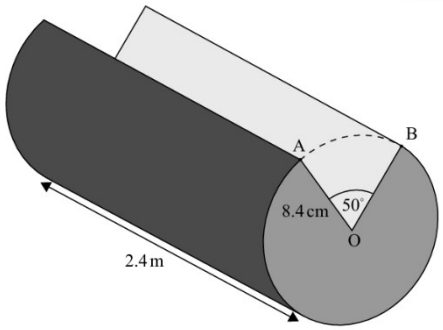
(a).....

(b).....

22. Helen is building a cabin using cylindrical logs of length 2.4 m and radius 8.4 cm. A wedge is cut from one log and the cross-section of this log is illustrated in the following diagram.

Find the volume of the log.

diagram not to scale



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23. Jae Hee plays a game involving a biased six-sided die. The faces of the die are labelled -3, -1, 0, 1, 2 and 5. The score for the game, X , is the number which lands face up after the die is rolled. The following table shows the probability distribution for X .

Score x	-3	-1	0	1	2	5
$\mathbf{P}(X=x)$	$\frac{1}{18}$	p	$\frac{3}{18}$	$\frac{1}{18}$	$\frac{2}{18}$	$\frac{7}{18}$

(a) Find the exact value of p.

(b) Jae Hee plays the game once. Calculate the expected score.

(c) Jae Hee plays the game twice and adds the two scores together.

Find the probability Jae Hee has a total score of -3.

Working:

Answers:

(a).....

(b).....

(c).....

24. Mr. Burke teaches a mathematics class with 15 students. In this class there are 6 female students and 9 male students. Each day Mr. Burke randomly chooses one student to answer a homework question.

(a) Find the probability that on any given day Mr. Burke chooses a female student to answer a question.

In the first month, Mr. Burke will teach his class 20 times.

(b) Find the probability he will choose a female student 8 times.

(c) Find the probability he will choose a male student at most 9 times.

Working:

Answers:

(a).....

(b).....

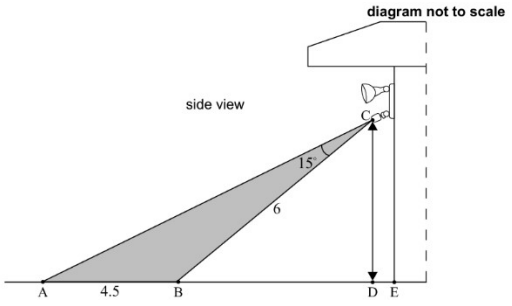
(c).....

25. Ollie has installed security lights on the side of his house that are activated by a sensor. The sensor is located at point C directly above point D. The area covered by the sensor is shown by the shaded region enclosed by triangle ABC. The distance from A to B is 4.5 m and the distance from B to C is 6 m. Angle AĈB is 15°.

(a) Find CÂB.

Point B on the ground is 5 m from point E at the entrance to Ollie's house. He is 1.8 m tall and is standing at point D, below the sensor. He walks towards point B.

(b) Find the distance Ollie is from the entrance to his house when he first activates the sensor.



Working:

Answers:

(a).....

(b).....

26. The Malvern Aquatic Center hosted a 3 metre spring board diving event. The judges, Stan and Minsun awarded 8 competitors a score out of 10. The raw data is collated in the following table.

Competitors	A	B	C	D	E	F	G	H
Stan's score (x)	4.1	3	4.3	6	7.1	6	7.5	6
Minsun's score (y)	4.7	4.6	4.8	7.2	7.8	9	9.5	7.2

(a) (i) Write down the value of the Pearson's product–moment correlation coefficient, r .
(ii) Using the value of r , interpret the relationship between Stan's score and Minsun's score.

(b) Write down the equation of the regression line y on x.

(c) Use your regression equation from part to estimate Minsun's score when Stan awards a perfect 10. State whether this estimate is reliable. Justify your answer.

The Commissioner for the event would like to find the Spearman's rank correlation coefficient.

(d) Copy and complete the information in the following table.

Competitors	A	B	C	D	E	F	G	H
Stan's Rank		8					1	4
Minsun's Rank		8					1	4.5

(e) Find the value of the Spearman's rank correlation coefficient, r_s. Comment on the result obtained for r_s .

(f) The Commissioner believes Minsun's score for competitor G is too high and so decreases the score from 9.5 to 9.1. Explain why the value of the Spearman's rank correlation coefficient r_s does not change.

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27. Bryan decides to purchase a new car with a price of €14 000, but cannot afford the full amoun
The car dealership offers two options to finance a loan.

Finance option A:

A 6 year loan at a nominal annual interest rate of 14% **compounded quarterly**.
No deposit required and repayments are made each quarter.

(a) (i) Find the repayment made each quarter.

(ii) Find the total amount paid for the car.

(iii) Find the interest paid on the loan.

Finance option B:

A 6 year loan at a nominal annual interest rate of r% **compounded monthly**. Terms of the loan require a 10% deposit and monthly repayments of €250.

(b) (i) Find the amount to be borrowed for this option.

(ii) Find the annual interest rate, r.

(c) State which option Bryan should choose. Justify your answer.

Bryan's car depreciates at an annual rate of 25% per year.

(d) Find the value of Bryan's car six years after it is purchased.

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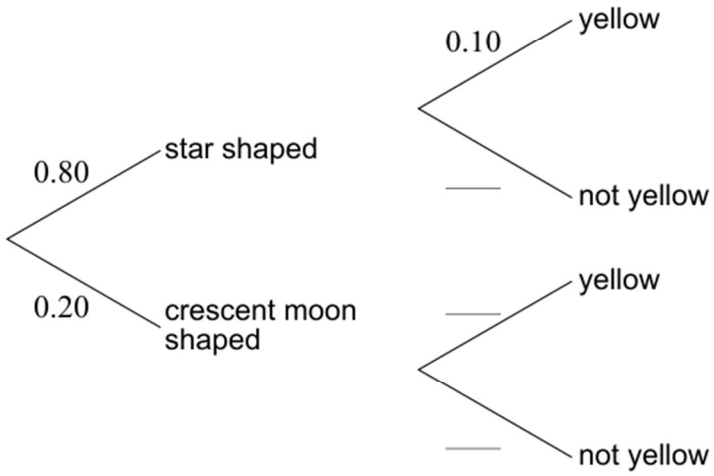
28. Slugworth Candy Company sell a variety pack of colourful, shaped sweets.

The sweets are produced such that 80% are star shaped and 20% are shaped like a crescent moon. It is known that 10% of the stars and 30% of the crescent moons are coloured yellow.

(a) Using the given information, **copy** and complete the following tree diagram.



(b) A sweet is selected at random.

(i) Find the probability that the sweet is yellow.

(ii) Given that the sweet is yellow, find the probability it is star shaped.

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29. **Find the exact value of each trigonometric function--no decimals, no calculators.**

1) $\sin\frac{5\pi}{6}$

2) $\cos\frac{3\pi}{4}$

3) $\cos\frac{5\pi}{3}$

4) $\sin 330°$

5) $\cos\frac{5\pi}{6}$

6) $\cos 180°$

7) $\sin\frac{3\pi}{4}$

8) $\cos\frac{7\pi}{4}$

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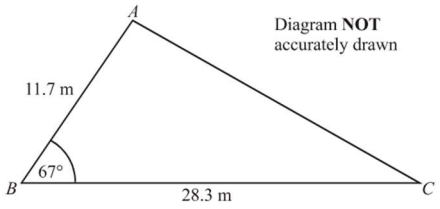
30. Given triangle ABC.

(a) Calculate the area of triangle ABC.

(b) Calculate the length of AC.



Working:

Answers:

(a).....

(b).....

31. A plane flies 1.3 hours at 110 mph on a bearing of 41°. It then turns and flies 1.5 hours at the same speed on a bearing of 131°. How far is the plane from its starting point?

Working:

Answers:

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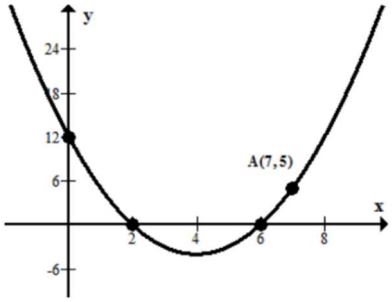
32. The parabola of a quadratic is shown below. The x -intercepts are at $x = 2$ and $x = 6$. The y -intercept is at $y = 12$. The curve passes through point A (7,5).

Without finding the equation of the curve and by just using the symmetry of the graph:
(a) Write down the equation of the axis of symmetry.
(b) Find the value of y for $x = 8$. Justify your answer.
(c) Find the value of y for $x = 1$. Justify your answer.



Working:

Answers:
(a) .....
(b) .....
(c) .....

33. Consider the points A (-2,5) and B (4,9).
(a) Find the gradient of the line L passing through A and B.
(b) Find the coordinates of the midpoint M between A and B.
(c) Find the equation of the line which is perpendicular to L and passes through the point M (i.e. the perpendicular bisector of the line segment [AB])
(d) Find the distance between the points A and B.
(e) Write down the distance between M and B, in the form a, where $a \in Z$.

Working:

Answers:
(a) .....
(b) .....
(c) .....
(d) .....
(e).....

Summer Math IB A&I-1

The purpose of this summer math assignment is to review five foundational Algebra and Geometry topics to allow more time for the new IB content. There will be some time in class and time outside of class for questions or clarification before an assessment on this material will be given. Summer math work and the assessment will count 5% in your first semester grade.

You may want to do additional problems in a set for better understanding or come back and do additional practice as needed. It is assumed you can graph a linear equation (sec 1B) and can simplify a radical (sec 3A prob 3), review if needed.

Some sections are longer, pace yourself, do a few sections each week. This should be familiar material. Read explanations and look at examples as needed. In IB, slope is called gradient.

There are four assignments, an assignment will be due every three weeks, **Sunday June 15**, **Sunday July 6, Sunday July 27** and **Sunday August 17**.
Late work will be accepted for reduced credit

Submit your work to Google Classroom for each assignment by the due dates indicated
* SHOW ALL WORK in a clear orderly way, label sections, write the original problem not answers only, graph on graph paper.
* CHECK your work (all answers are in the back of the book), make note of any problems you have trouble with.

Due Sunday June 15

Chapter 1 Straight Lines
Sec 1A pgs 22-26 pr 6, 9d, 18b, d, 21c
Sec 1C pg 29 pr 3, 4, 8
Sec 1D pgs 30-31 pr 2c, 3b, c / pg 31 pr 1b / pg33 pr 2e, 3e
Sec 1E pgs 34-35 pr 2, 6

Chapter 3 Surds and Exponents
Sec 3A pgs 66-68 pr 1i, j, l, 6d, e 7f, 8c, e, 9g, i, 10a, e
Sec 3B pg 69 pr 1a, e, i, m, q, 2b, e, g, j, o, 3b, d, f, h
Sec 3C pg 70 pr 3a, b, f, g, 4c, d, e, f, g
Sec 3D pg 72-77 pr 2e, j, 3a, g, 4a, e, 5d, e, 7c, d, f, g, h, i, 9d, h, i, k, n

Due Sunday July 6

Chapter 3 Surds and Exponents (continued)
Sec 3D pgs 74-77 pr 11e, i, k, 13f, j, 14g, h, 15g, 16e, f, g, h, p, 18d, e, 19j, 20f
Sec 3E pgs 78-80 pr 2k, l, 9, 10, 11, 12a-d

Chapter 4 Equations
Sec 4A pg 85 pr 2g, h, i, l
Sec 4B pg 86 pr 1b, c, d, e, g, i, 2b, d, e, f, g, h, i, 3a, b, 4b, c, d, g, i
Sec 4D.1 pgs 88-90 pr 1a, f, 2b, e, f, g, i, 3a, b, c, d, f, g, j, 4b, e

Due Sunday July 27

Chapter 4 Equations (continued)

Sec 4D.3 pg 93 pr 1b, f, h, 2a, c, e, g, h
Sec 4D.4 pgs 94-95 pr 1, 2, 3, 4, 6
Sec 4F pgs 97-98 pr 2a, b, c, 3a, b, 4a

Chapter 6 Measurement

Sec 6A pgs 147-148 pr 1, 2e, 3, 5e
Sec 6B.1 pgs 149- 151 pr 2b, 4a, 7
Sec 6B.2 pgs 152-154 pr 1b, c, 5, 11

Due Sunday August 17

Chapter 6 Measurement (continued)

Sec 6C.1 pgs 154-157 pr 1e, g, 3b, 11
Sec 6C.2 pgs 160-161 pr 1b, c, d, e, 2a, 4
Sec 6D pgs 164-166 pr 1, 2, 4c,10

Chapter 7 Right Triangle Trigonometry

Sec 7A pgs 176 pr 7
Sec 7B pgs 177-178 pr 2a, b, c, i, j, k, 4a, b, c
Sec 7C pgs 179-180 pr 1a, b, c, 3a, b, c, 5a, b