Pasir Ris Crest Secondary School
Nov/Dec Holiday Assignment 2025
Secondary 2 G3
Mathematics
Teacher In-charge: Ms Karin Wong

Name: _____ ( ) Class: _____

No.		Duration
1	**Section A: Sec 3 Express Chapter 1.2 Solving Quadratic Equations by using Formula** 1. Log into SLS and watch the video (for Section A) on the lesson. 2. Complete the questions in Section A.	30 mins
2	Algebra revision **Section B: Expansion and Factorisation**	30 mins
3	Algebra revision **Section C: Algebraic Fractions**	30 mins
4	**Section D: Trigonometry**	30 mins
5	**Section E: Statistical Averages Mean, Median Mode**	30 mins
6	**Section F: Coordinate Geometry**	30 mins

Total 3 hours

- **Log in to SLS account to view the Sec 2 G3 Math 2025 Nov/Dec Holiday assignment (Questions and Videos) for learning the concept for Section A as well as concepts recap videos for revision Sections B to F.**
- **Complete all the compulsory questions on foolscap paper.**
- **The questions marked with * are optional.**
- **Please submit this holiday homework on the first math lesson of Term 1 2026.**

Section A: Sec 3 Express Chapter 1.2 Solving Quadratic Equations by using Formula (*Compulsory*)

Solve the following equations **by using the quadratic formula**.

(a) $11x^2 + 14x - 1 = 0$	**(b)** $3x^2 - 9 = 14x$
(c) $5x^2 - 7x = 13$	**(d)** $\frac{5}{x-3} = x - 3$

Section B: Expansion and Factorisation (*Optional)

1 General Expansion of Algebraic Expressions

(A) Using "rainbow" method

$b(c+d)$ = _____

$(a+b)(c+d)$ = _____

(B) Using special identities

$(a+b)^2$ = _____

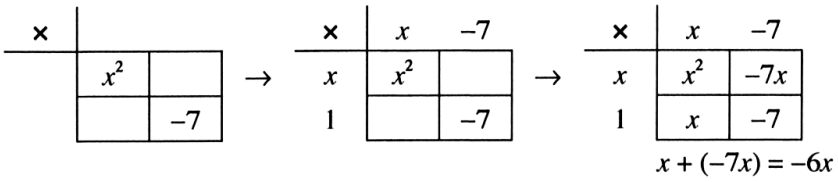
$(a-b)^2$ = _____

$(a+b)(a-b)$ = _____

2 Factorisation of Algebraic Expressions

(A) We should **extract common factor** if there is a common factor among all the terms in the algebraic expression.
For example, $\mathbf{2x^2 + 4x + 8 = 2(x^2 + 2x + 4)}$

(B) The general form of a quadratic expression in one variable is $ax^2 + bx + c$, where x is the variable, a, b and c are constants and $a \neq 0$.
We can use a **multiplication frame** to factorise quadratic expressions.
For example, consider the expression $x^2 - 6x - 7$.



Step 1: Write x^2 in the top-left corner and -7 in the bottom-right corner of the multiplication frame.
Step 2: Consider the factors of x^2 and -7. Write them in the first column and the first row.
Step 3: Multiply them to complete the multiplication frame and check whether the result matches the given expression.
Therefore, $x^2 - 6x - 7 = (x + 1)(x - 7)$.

(C) By grouping:

$$ax + bx + kay + kby = x(a + b) + ky(a + b)$$
$$= (a + b)(x + ky)$$

(D) Special Algebraic Identities

We can use the **multiplication frame** to prove these special identities.

Perfect Squares: $(a + b)^2 = a^2 + 2ab + b^2$
$(a - b)^2 = a^2 - 2ab + b^2$

Difference of Two Squares: $(a + b)(a - b) = a^2 - b^2$

[**Example 1]**
Expand and simplify the following:

(a) $3m(2m-7)-5(-9+4m)$	**(b)** $(a+5)^2+(3-a)^2$
(c) $(5-6b)(5+6b)$	

[Try It 1]
Expand and simplify the following:

(a) $2p-3q(2p-5r)$	**(b)** $(xy-5)(xy+8)$
(c) $(a+1)(a-3)+(2a-3)(5-7a)$	**(d)** $(2e+f)(3e-4f)+(5e-6f)^2$

[Example 2]
Factorise the following.

(a) $9st + 3s^2t^2$	**(b)** $7(3p+8q) - 6d(3p+8q)$
(c) (i) Factorise $xy - yz$. **(ii)** Using the result in (i), find the value of $3165 \times 876543 - 876543 \times 3155$.	
(d) $4a^2b - 64b$	**(e)** $4x(3a-b) - 5y(b-3a)$

[Try It 2]
Factorise the following.

(a) $8pq + 24rq - 64qs$	**(b)** $(3a-b)(x+y) - (4b+c)(x+y)$

(c) (i) Factorise $ab - bc$.

(ii) Using the result in (i), find the value of $4430 \times 56 - 3430 \times 56$.

(d) $81m^2 - n^2$

(e) $4p^2 - 144$

(f) $(3a - 4b)(c - d) + (6a - 5b)(c - d)$

(g) $3(2x - y) + 2a(y - 2x)$

[Example 3]

Factorise the following completely.

(a) $x^2 - 6x - 7$

(b) $x^2 - 13x + 42$

(c) $42x^2 - 40x - 18$

[Try It 3]
Factorise the following completely.

(a) $2x^2+15x+28$	**(b)** $x^2-12x+27$
(c) $6x^2+13x-28$	**(d)** $15x^2-8x-63$

[Example 4]
Factorise the following completely.

(a) $3ab-9ac-2bd+6cd$	**(b)** $2pq-8p-20+5q$

[Try It 4]
Factorise the following completely.

(a) $2bv-21aw-14bw+3av$	**(b)** $2bg-3cg+6bf-9cf$

Section B: Expansion and Factorisation *(Compulsory)*

1 Expand and simplify $(2h + 3)(h – 7) – (h + 4)(h^2 – 1)$

2 Expand and simplify $(7 – c)(5c^2 – 2c + 1)$.

3 Factorise completely $3bx – 6ay – 3ab + 6xy$.

4 Factorise $4b^2 – 6b + 6bk – 9k$ completely.

5 Factorise $6t^2 – 18t$ completely.

6 Factorise $4x^3 + 4x^2 – 3x$ completely.

7 Factorise $a(b – c) + bc – a^2$ completely.

8 Factorise $2p(5r – 7s) + 3q(7s – 5r)$ completely.

9 Factorise $6a^2 – 3a – 30$ completely.

10 Given that the expression $2x^2 – 2.9x – 3.6$ can be factorised into the form $0.1(px + q)(rx + s)$, where p, q, r and s are integers, find the value of $p + q + r + s$.

11 x is a positive integer.

(i) Explain why $(2x – 1)$ is an odd number.

(ii) Write down an expression for the next odd number which is greater than $(2x – 1)$.

(iii) Find and simplify the expressions of the squares of these two odd numbers.

(iv) Hence, explain why the difference between the squares of two consecutive odd numbers is always divisible by 8.

Section C: Algebraic Fractions (*Optional)

Multiplication and Division of Algebraic Fractions

(1) The value of a fraction remains unchanged if both its numerator and denominator are multiplied or divided by the same non-zero number or expression,

$$\frac{a}{b}=\frac{a\times c}{b\times c} \quad \text{and} \quad \frac{a}{b}=\frac{a\div c}{b\div c}$$

where $b\neq 0$ and $c\neq 0$.

(2) When we multiply $\frac{a}{b}$ by $\frac{c}{d}$, we have:

$$\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}, \text{ where } b\neq 0 \text{ and } d\neq 0.$$

(3) When we divide $\frac{a}{b}$ by $\frac{c}{d}$, we have:

$$\frac{a}{b}\div\frac{c}{d}=\frac{a}{b}\times\frac{d}{c}=\frac{ad}{bc}, \text{ where } b, c, d\neq 0.$$

[Example 1]
Simplify each of the following.

Simple multiplication and division.	
(a) $\frac{4ab^2}{15c^2d}\times\frac{10c^3d}{8ab}$	**(b)** $\frac{7p^3q}{3r^2s^5}\div\frac{14q^2r^3}{6ps^3}$
Factorise first, then perform the multiplication or division.	
(c) $\frac{x^2-4y^2}{x^2+5xy}\times\frac{2x+10y}{3x-6y}$	**(d)** $\frac{x^2+7x+12}{x^2-36}\div\frac{x+4}{x+6}$

[Try It 1]
Simplify each of the following.

(a) $\frac{3a}{4b}\times\frac{8b^2}{9a^3}$	**(b)** $\frac{5a^3b}{6yz^2}\times\frac{36z}{25a^2b^3}$
(c) $\frac{2x+5}{3x-2}\times\frac{15x-10}{2x}$	**(d)** $\frac{35xy^3}{15yz^2}\div\frac{14x^2z}{6y^2z^3}$
(e) $\frac{121-y^2}{a^2-y^2}\div\frac{y-11}{y+a}$	**(f)** $\frac{3x-7}{5x^2}\div\frac{9x-21}{27x}$

Addition and Subtraction of Algebraic Fractions

(1) Identify the LCM of the _____ first.

(2) Multiply the numerator and denominator of the fractions with suitable factors so that they both have common denominators.

(3) Once both fractions have common denominators, combine the fraction into a single fraction.

(4) Simplify the numerator.

[Example 2]
Simplify each of the following as a single fraction in its simplest form.

(a) $\frac{6}{mn}-\frac{7}{nt}$	**(b)** $\frac{m}{m-n}-\frac{n+m}{n-m}$
(c) $\frac{8}{x^2-4}+\frac{3}{2-x}$	**(d)** $\frac{3}{x^2-10x+25}-\frac{8}{x-5}$

[Try It 2]
Simplify each of the following as a single fraction in its simplest form.

(a) $\frac{5}{3x}-\frac{1}{6x}$	**(b)** $\frac{4}{2f-3}-\frac{2}{3-2f}$
(c) $\frac{4}{p+3r}-\frac{p-21r}{p^2-9r^2}$	**(d)** $\frac{4m+2}{m^2+m-6}-\frac{2}{m+3}$

(e) $\dfrac{2y}{(2x-3y)(x+y)}+\dfrac{7}{x+y}$	**(f)** $\dfrac{2x+7}{7-2x}-1$

Section C: Algebraic Fractions (*Compulsory*)

1 Simplify $\dfrac{3}{x-5}-\dfrac{x-2}{(x-5)^2}$.

2 Express $\dfrac{7}{2(3p-1)}-\dfrac{3}{(1-3p)}$ as a single fraction in its simplest form.

3 Simplify $\dfrac{2y+2}{y^2-1}+\dfrac{5}{1-y}$.

4 **(a)** Express $\dfrac{1}{x-2}\times\dfrac{6-x-x^2}{1-x}$ as a single fraction.

(b) Hence, or otherwise, solve the equation $\dfrac{1}{x-2}\times\dfrac{6-x-x^2}{1-x}=5$.

5 **(a)** Express $\dfrac{2x-4}{4x^2-9}+\dfrac{4x}{2x-3}$ as a single fraction in its simplest form.

(b) Hence solve the equation $\dfrac{2x-4}{4x^2-9}+\dfrac{4x}{2x-3}=0$.

6 Simplify the following.

(a) $\dfrac{(2a-3b)^2}{6a^2-9ab}$

(b) $\dfrac{6h^2-13h-5}{6h^2+17h+5}$

(c) $\dfrac{(p+q)^2-r^2}{(q+r)^2-p^2}$

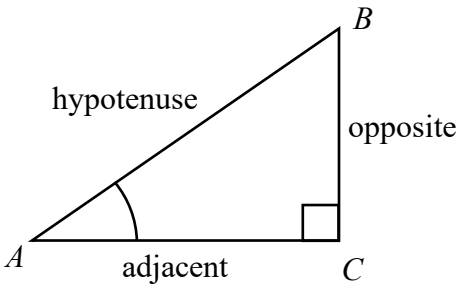
(d) $\dfrac{2ac+bc-2ad-bd}{cx-3cy-dx+3dy}$

(e) $\dfrac{2}{h^2}\times\dfrac{1}{k^3}\div\dfrac{2h}{3k}$

(f) $\dfrac{25d^3e}{46df}\div\dfrac{15de^2}{21d^3f^2}$

Section D: Trigonometry (*Optional)

Trigonometric Ratios



[A] In Triangle ABC, if angle $C = 90°$, then

$\frac{BC}{AB} = \frac{\text{opp}}{\text{hyp}}$ is called the sine of angle A or $\sin A = \frac{\text{opp}}{\text{hyp}}$,

$\frac{AC}{AB} = \frac{\text{adj}}{\text{hyp}}$ is called the cosine of angle A or $\cos A = \frac{\text{adj}}{\text{hyp}}$,

$\frac{BC}{AC} = \frac{\text{opp}}{\text{adj}}$ is called the tangent of angle A or $\tan A = \frac{\text{opp}}{\text{adj}}$.

[B] In Triangle ABC,

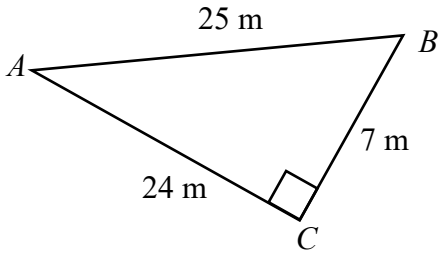
If $\sin A = \frac{\text{opp}}{\text{hyp}}$ then angle $A = \sin^{-1}\left(\frac{\text{opp}}{\text{hyp}}\right)$,

If $\cos A = \frac{\text{adj}}{\text{hyp}}$ then angle $A = \cos^{-1}\left(\frac{\text{adj}}{\text{hyp}}\right)$,

If $\tan A = \frac{\text{adj}}{\text{opp}}$ then angle $A = \tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right)$.

[Example 1]

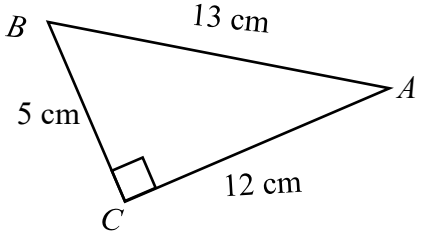
For each of the following right-angled triangles, state the value of



(a) $\sin A$	**(d)** $\sin B$
(b) $\cos A$	**(e)** $\cos B$
(c) $\tan A$	**(f)** $\tan B$

[Try It 1]

For each of the following right-angled triangles, state the value of

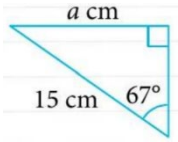


(a) sin A	**(d)** sin B
(b) cos A	**(e)** cos B
(c) tan A	**(f)** tan B

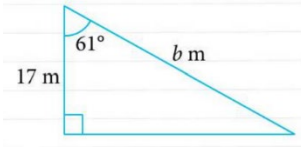
[Example 2]

Find the value of the unknown in each of the right-angled triangles.

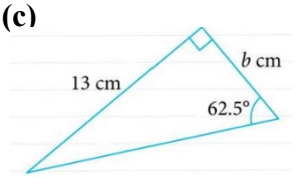
(a)



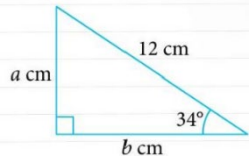
(b)



(c)



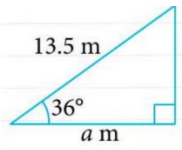
(d)



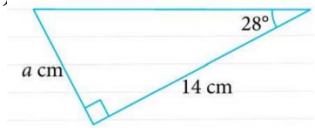
[Try It 2]

Find the value of the unknown in each of the right-angled triangles.

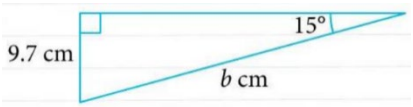
(a)



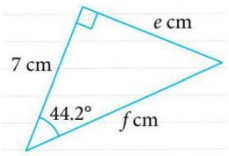
(b)



(c)

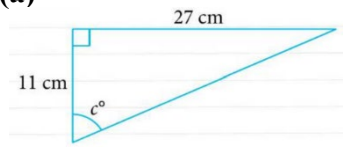


(d)

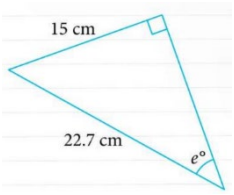


[Example 3]
Find the value of the unknown in each of the right-angled triangles.

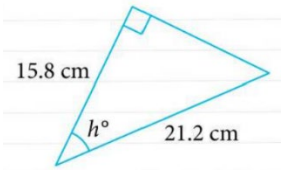
(a)



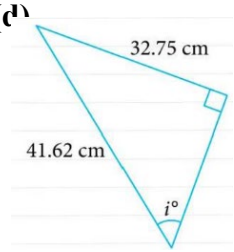
(b)



(c)

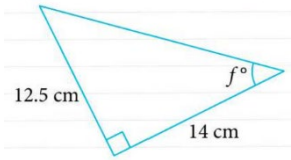


(d)

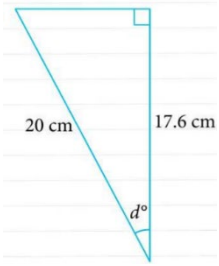


[Try It 3]
Find the value of the unknown in each of the right-angled triangles.

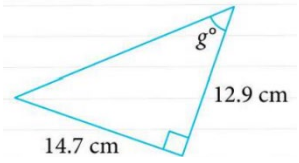
(a)



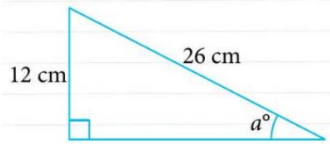
(b)



(c)

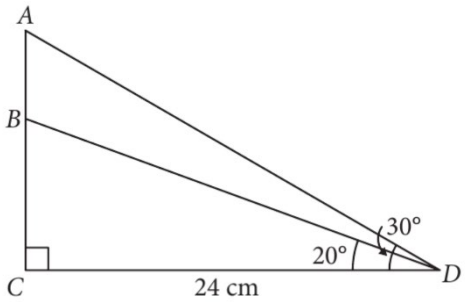


(d)



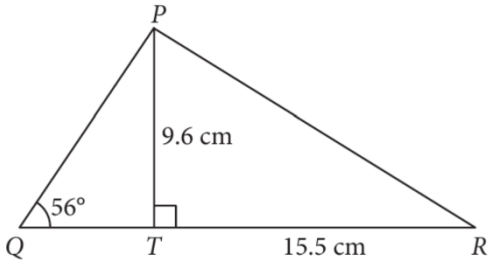
[Try It 4]

(a) The diagram shows two right-angled triangles *ACD* and *BCD*.
CD = 24 cm, angle *ADC* = 30° and angle *BDC* = 20°.
Find the length of *AB*.



(b) In triangle *PQR*, angle *PQR* = 56°. *T* is a point on *QR* such that *PT* is perpendicular to *QR*. *PT* = 9.6 cm and *TR* = 15.5 cm.

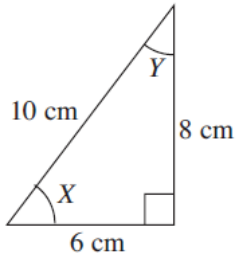
(i) Find angle *PRQ*.
(ii) Find the length of *PQ*.



Section D: Trigonometry (*Compulsory*)

1 State the value of

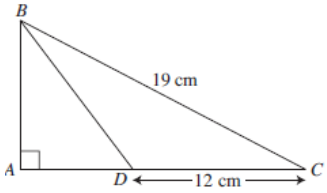
(i) sin X,
(ii) cos X,
(iii) tan X,
(iv) sin Y,
(v) cos Y,
(vi) tan Y.



2. In $\triangle ABC$, $BC = 19$ cm, $CD = 12$ cm and the area of $\triangle BCD$ is 45 cm^2.

Find

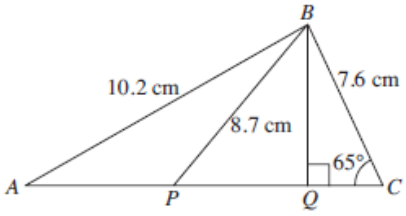
(i) the length of AB,
(ii) the length of AD,
(iii) $\angle BDC$.



3. In the figure, $AB = 10.2$ cm, $BC = 7.6$ cm, $PB = 8.7$ cm, $\angle BQC = 90°$ and $\angle BCA = 65°$.

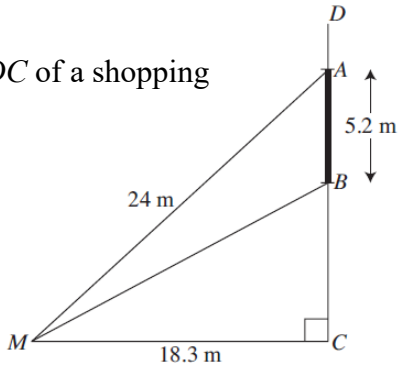
Find

(i) the length of BQ,
(ii) the length of PQ,
(iii) the length of AP,
(iv) $\angle APB$.

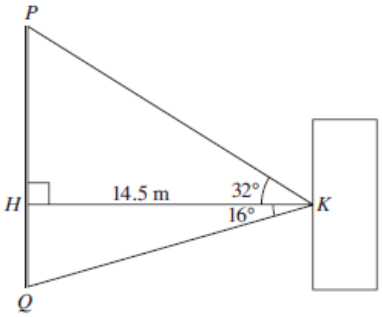


4. The figure shows an advertisement screen AB mounted on the wall DC of a shopping mall. Michael sits at a point M.
Given that $AB = 5.2$ m, $AM = 24$ m and $MC = 18.3$ m, find

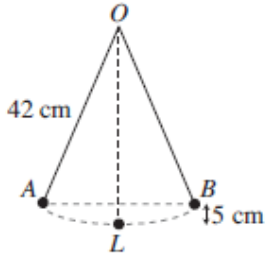
(i) the height of BC,
(ii) $\angle BMC$,
(iii) $\angle AMB$.



5. The figure shows a vertical monument PQ. Khairul is standing at the second storey of a viewing gallery 14.5 m away.
Given that $\angle PKH = 32°$ and $\angle QKH = 16°$, find the height of the monument.



6. A pendulum bob attached to a point O swings from A to B, passing through the lowest point at L.
Given that $OA = 42$ cm and the vertical height between the highest and lowest points of the swing is 5 cm, find $\angle AOB$.



Section E: Statistical Averages Mean, Median Mode (*Optional)

[A] Mean

(i) Mean of raw data $\text{Mean} = \dfrac{\text{sum of data values}}{\text{number of data values}}$

(ii) Mean of frequency distribution

x	x_1	x_2	x_3	…	x_n
f	f_1	f_2	f_3	…	f_n

$$\text{Mean} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + \ldots + f_nx_n}{f_1 + f_2 + f_3 + \ldots + f_n}$$

(iii) Mean of grouped data

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{f_1x_1 + f_2x_2 + f_3x_3 + \ldots + f_nx_n}{f_1 + f_2 + f_3 + \ldots + f_n},$$

where x is the ***mid-value** and f is the **frequency** of each class interval.

* For a class interval $a < x \le b$, mid-value $= \dfrac{a+b}{2}$.

[Example 1]

For the mean of each data set or distribution.

(a) 38, 36, 34,32

(b) 8.3, 2.6, 7.4, 1.8, 9.5

(c)

x	2	3	4	5	6	7
Frequency	11	17	24	23	18	15

Find the estimated mean of the following distribution.

(d)

x	$14 < x \le 16$	$16 < x \le 18$	$18 < x \le 20$	$20 < x \le 22$
Frequency	5	12	23	10

(e)

x	Frequency
$0 \le x < 10$	26
$10 \le x < 20$	35
$20 \le x < 30$	18
$30 \le x < 40$	7
$40 \le x < 50$	4

[Try It 1]

For the mean of each data set or distribution.

(a) $-5, 2, -1, 0, -9, 4$

(b)

x	Frequency
0	35
1	76
2	48
3	22

(c)

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

Key
4 | 3 means 4.3 m³

Find the estimated mean of the following distribution.

(d)

Height (x cm)	Number of plants
$0 < x \leq 10$	4
$10 < x \leq 20$	6
$20 < x \leq 30$	14
$30 < x \leq 40$	6
$40 < x \leq 50$	10

(e)

Time taken (x minutes)	$15 < x \leq 20$	$20 < x \leq 25$	$25 < x \leq 30$	$30 < x \leq 35$	$35 < x \leq 40$
Number of teenagers	5	10	20	15	18

[B] Median

(i) Median when number of data values is <u>odd</u>

Step 1: Rearrange the data in ascending order

Step 2: Find the position of the median, $\frac{n+1}{2}$

Step 3: The median is the data at the $\left(\frac{n+1}{2}\right)$th position.

(i.e. The median is the middle value of the arranged data)

(ii) Median when number of data values is <u>even</u>

Step 1: Rearrange the data in ascending order

Step 2: Find the position of the median, $\frac{n+1}{2}$

Step 3: The median is the mean of the two data before and after the $\left(\frac{n+1}{2}\right)$th position.

Eg. If the position of the median is the 4.5^{th} position
Median = Mean of the 4^{th} and 5^{th} data

(i.e. The median is the mean of the middle two values of the arranged data)

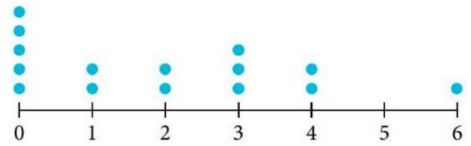
[Example 2]

For the median of each of the data set or distribution.

(a) 11.2, 15.6, 30.2, 17.3, 18.2

(b) 8, 7.3, 8.9, 6.8, 8.8, 8.9, 10, 6.5

(c)



(d)

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

Key: 3 | 6 means 3.6 km

(e)

Time taken (minutes)	5	6	7	8	9
Number of children	8	4	3	10	3

[Try It 2]

For the median of each of the data set or distribution.

(a) 41, 96, 27, 50, 83

(b) 12, 4, 8, 33, 2, 2

(c)

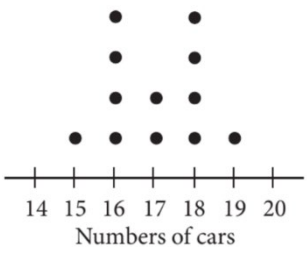
Number of siblings	0	1	2	3
Frequency	7	10	12	5

(d)

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

Key
6 | 7 means 67 marks

(e)



[C] Mode / Modal **Mode = data value(s) with the highest frequency**

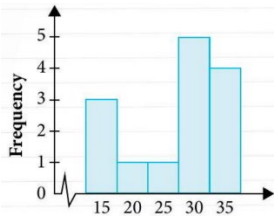
[Example 3]

For each of the following, state the mode(s) of the distribution.

(a) 8.1, 7.7, 7.8, 9.3, 6.4, 7.7, 9.3, 7.7

(b)

(c)



[Try It 3]

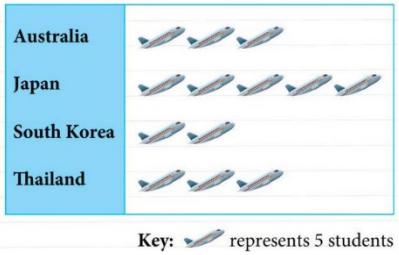
For each of the following, state the mode(s) of the distribution.

(a)

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

Key: 2 | 1 means 21

(b)



[Try It 4]

The number of pets 40 students own is recorded.

Number of pets	2	4	6	8	10
Number of students	x	2	y	6	14

(a) (i) Show that $x + y = 18$.

(ii) If the mean of the distribution is 6.4, show that $x + 3y = 30$.

(iii) Hence, find the value of x and of y.

(b) Find

(i) the median,

(ii) the mode, of the distribution.

Section E: Statistical Averages Mean, Median Mode (*Compulsory*)

1. The heights, in metres, of a group of boys who have signed up for the trials of the school basketball team are recorded.

1.8, 1.9, 2.0, 1.7, 1.8, 1.9, 1.6, 2.0, 1.8, 1.9, 1.8

(a) Find

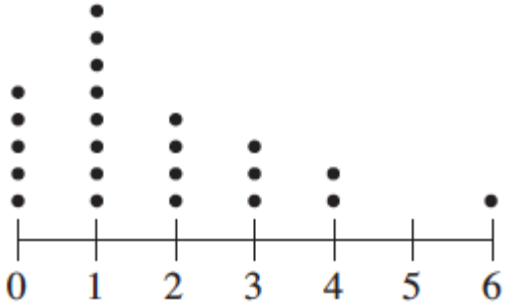
(i) the modal height,

(ii) the median height,

(iii) the mean height.

(b) When a 12^{th} boy joins the group, the mean height becomes 1.85 m. Find the height of the 12^{th} boy.

2. The dot diagram represents the number of siblings a child has.



(a) How many children participated in the survey?
(b) Write down the greatest number of children there are in a family.
(c) Find the average number of children there are in a family.
(d) Another k children, each with 5 siblings, participate in this survey.
Given that the fraction of the children with fewer than 2 siblings is now 13251325, find the value of k.

3. As part of the school's 'Plant a plant' month, 100 students each sowed 5 seeds into each of 100 plant pots. One week later, the number of seeds germinating in each pot was recorded and the results are given in the table.

Number of seeds germinating	0	1	2	3	4	5
Number of pots	10	30	25	20	10	5

(i) Write down the total number of seeds that were sown.

(ii) Find the fraction of the seeds that germinated.

(iii) Calculate the mean, the median and the mode of the distribution.

4. The table shows the number of marks scored by a group of pupils in a quiz marked out of a total of 5 marks.

Marks	0	1	2	3	4	5
Number of pupils	2	3	4	2	2	x

(a) If the mode is 2, state the possible values of x.
(b) If the median mark is 3, find the possible values of x.
(c) If the mean mark is 3, find x.

5. The back-to-back stem-and-leaf diagram represents the number of emergency calls received by the police force per day in October and December last year.

Leaves for October	**Stem**	**Leaves for December**
8 7 7 5 4 4 4	0	8
7 1 1 0 0	1	0 3 4
9 9 8 7 6 6 5 5 5	2	0 0 1 1 1 1 8
6 5 3 3	3	2 3 3 5 7 7 7 9
5 4 1 0 0 0	4	6 6 7 8 8 8 8 9 9 9 9 9

Key: 2 | 0 means 20 emergency calls

(a) State the modal number of emergency calls received in December.
(b) Find the median and the mean number of emergency calls received in each month.
(c) Comment briefly on the distribution of the data.

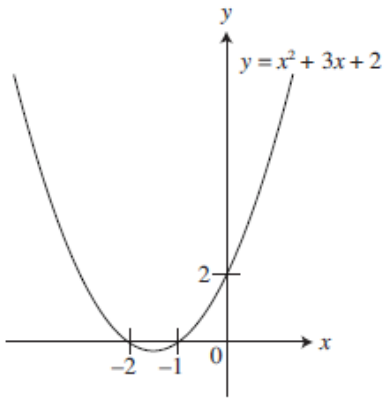
6. In a cross-country race, the winner completed the race in exactly 114114 hours. Three more runners completed the race within a three-minute interval. In the next such interval, seven runners finished the race. The table below shows the number of runners who finished the race in six consecutive three-minute intervals.

Time intervals in minutes	**Number of runners who finished the race**
0 – 3	4
3 – 6	7
6 – 9	13
9 – 12	26
12 – 15	38
15 – 18	20

(a) Illustrate the data using a histogram.
(b) State the modal interval.
(c) Using the mid-interval value, calculate the mean race-time of the first 50 runners.
(d) If the average number of runners finishing for the 5^{th}, 6^{th} and 7^{th} intervals was 31, how many runners finished in the 7th interval?

Section F: Coordinate Geometry (*Compulsory*)

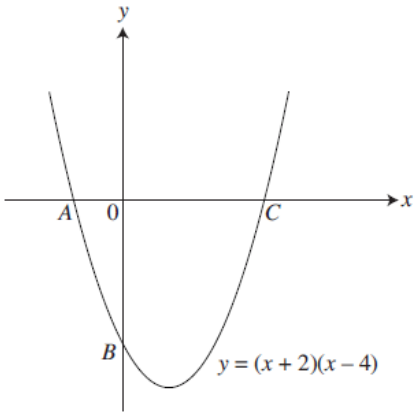
1. The figure shows the graph of $y = x^2 + 3x + 2$.



(i) Write down the solutions of the equation $x^2 + 3x + 2 = 0$.

(ii) Find the equation of the line of symmetry of the graph.

3. The figure shows the curve $y = (x + 2)(x – 4)$. The curve cuts the x-axis at two points A and C, and the y-axis at the point B.



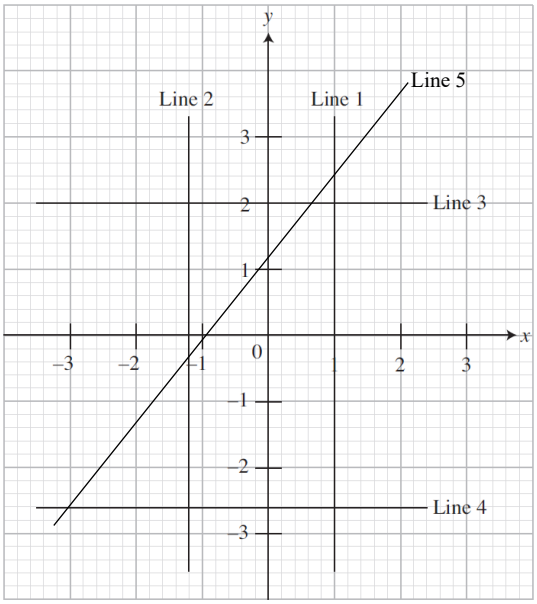
(i) Write down the coordinates of A, B and C.

(ii) Find the equation of the line of symmetry of the curve.

(iii) Hence, find the coordinates of the point.

4. **(a)** Write down the equation of each of the given lines.

(b) Find the area enclosed by the lines 1, 2, 3 and 5.



ANSWERS

Section A: ***Sec 3 Express Chapter 1.2 Solving Quadratic Equations by using Formula***

Compulsory

(a) $x = 0.0678$ or -1.34

(b) $x = 5.24$ or -0.573

(c) $x = 2.46$ or -1.06

(d) $x = 5.24$ or 0.764

Section B: Expansion and Factorisation

******Optional*

[Try it 1]

1(a) $2p - 6pq + 15qr$ **1(b)** $x^2y^2 + 3xy - 40$

1(c) $-13a^2 + 29a - 18$ **1(d)** $31e^2 - 65ef + 32f^2$

[Try it 2]

2(a) $8q(p + 3r - 8s)$ **2(b)** $(x + y)(3a - 5b - c)$

2(c)(i) $b(a - c)$ **(ii)** $= 56(4430 - 3430) = 56 \times 1000 = 56000$

2(d) $(9m - n)(9m + n)$ **2(e)** $4(p - 6)(p + 6)$

2(f) $9(c - d)(a - b)$ **2(g)** $(2x - y)(3 - 2a)$

[Try it 3]

3(a) $(2x + 7)(x + 4)$ **3(b)** $(x - 9)(x - 3)$

3(c) $(3x - 4)(2x + 7)$ **3(d)** $(3x - 7)(5x + 9)$

[Try it 4]

4(a) $(2b + 3a)(v - 7w)$ **4(b)** $(2b - 3c)(g + 3f)$

Compulsory

1 $-h^3 - 2h^2 - 10h - 17$	**8** $(2p - 3q)(5r - 7s)$
2 $-5c^3 + 37c^2 - 15c + 7$	**9** $3(2a + 5)(a - 3)$
3 $3(x - a)(b + 2y)$	**10** 4
4 $(2b - 3)(2b + 3k)$	**11** (ii) $2x + 1$ (iii) $4x^2 - 4x + 1$ and $4x^2 + 4x + 1$
5 $6t(t - 3)$ **6** $x(2x + 3)(2x - 1)$	
7 $(b - a)(a + c)$	

Section C: Algebraic Fractions

Optional

1(a) $\frac{2b}{3a^2}$ **(b)** $\frac{6a}{5b^2yz}$ **(c)** $\frac{10x+25}{2x}$

(d) $\frac{y^4}{x}$ **(e)** $\frac{y+11}{y-a}$ **1(f)** $\frac{9}{5x}$

2(a) $\frac{3}{2x}$ **(b)** $\frac{6}{2f-3}$ **(c)** $\frac{3}{(p-3r)}$

2(d) $\frac{2}{m-2}$ **(e)** $\frac{-19y+14x}{(2x-3y)(x+y)}$ **(f)** $\frac{4x}{7-2x}$

Compulsory

1) $\frac{2x-13}{(x-5)^2}$ **2)** $\frac{13}{2(3p-1)}$ **3)** $\frac{-3}{y-1}$

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

5(a) $\frac{8x^2+14x-4}{(2x+3)(2x-3)}$ or $\frac{8x^2+14x-4}{4x^2-9}$ or $\frac{2(4x-1)(x+2)}{(2x+3)(2x-3)}$ **(b)** $\frac{1}{4}$ or -2

6(a) $\frac{2a-3b}{3a}$ **(b)** $\frac{2h-5}{2h+5}$ **(c)** $\frac{p+q+r}{q+r-p}$ **(d)** $\frac{2a+b}{x-3y}$ **(e)** $\frac{3}{h^3k^2}$ **(f)** $\frac{5d^4f}{7e}$

Section D: Trigonometry

Optional

1(a) $\frac{5}{13}$ **(b)** $\frac{12}{13}$ **(c)** $\frac{5}{12}$

1(d) $\frac{12}{13}$ **(e)** $\frac{5}{13}$ **(f)** $\frac{12}{5}$

2(a) 10.9 m **(b)** 7.44 cm **(c)** 37.5 cm

2(d) $e = 4.88$ cm, $f = 9.76$ cm

3(a) 41.8° **(b)** 28.4° **(c)** 48.7°

3(d) 27.5°

4(a) 5.12 cm **(b)(i)** 31.8° **(b)(ii)** 11.6 cm

Compulsory

1 (i) $\frac{4}{5}$ **(ii)** $\frac{3}{5}$ **(iii)** $1\frac{1}{3}$ **(iv)** $\frac{3}{5}$ **(v)** $\frac{4}{5}$ **(vi)** $\frac{3}{4}$

2 (i) 7.5 cm **(ii)** 5.46 cm **(iii)** 126.0°

3 (i) 6.89 cm **(ii)** 5.31 cm **(iii)** 2.21 cm **(iv)** 127.7°

4 (i) 10.3 m **(ii)** 29.4° **(iii)** 10.9° **5** 13.2 **6** 56.5°

Section E: Statistical Averages Mean, Median Mode

Optional

1(a) -1.5 **(b)** $1\frac{57}{181}$ **(c)** $58\frac{1}{11}$

1(d) 28 **(e)** $6\frac{6}{7}$

2(a) 50 **(b)** 6 **(c)** 1.5

2(d) 79.5 **(e)** 17

3(a) 60 **(b)** Japan

4(a)(iii) $x = 12$, $y = 6$ **(b)(i)** 7 **(b)(ii)** 10 pets

Compulsory

1 (a)(i) 1.8 **(ii)** 1.8 **(iii)** 1.84 **(b)** 2 **2(a)** 23 **(b)** 7 **(c)** 2.70 **(d)** 2 **3(i)** 500 **(ii)** $\frac{41}{100}$ **(iii)** Mean 2.05 Median 2 Mode 1	**4(a)** 3, 2, 1 or 0 **(b)** 6, 7 or 8 **(c)** 7 **5(a)** 49 **(b)** October: Median 26 Mean 23.4 December: Median 37 Mean 34.1 **6(b)** 12 – 15 **(c)** 1 h 23 min **(d)** 35

Section F: Coordinate Geometry

Compulsory

1 **(i)** $x = -2$ or $x = -1$ **(ii)** $x = -1.5$	
3 **(i)** $\therefore A(-2, 0), B(0, -8), C(4, 0) y = (x + 2)(x - 4)$ **(ii)** $x = 1$. **(iii)** $(1, -9)$.	**4(a)** Line 1: $x = 1$ Line 2: $x = -1.2$ Line 3: $y = 2$ Line 4: $y = -2.6$ Line 5: $y = x+1$ **(b)** 2.42