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CLASS:	
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SUBJECT TEACHER: _____



YISHUN TOWN SECONDARY SCHOOL

G3

PRELIMINARY EXAMINATION 2026

SECONDARY 4/5

MATHEMATICS G3

PAPER 1 (4052/01)

DATE : 11 August 2026

DAY : Tuesday

DURATION : 2 h 15 min

MARKS : 90

READ THESE INSTRUCTIONS FIRST

Do not turn over the cover page until you are told to do so.

Write your name, class and class index number in the spaces at the top of this page.

Write in dark blue or black pen.

You may use a pencil for any diagrams or graphs.

Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.

If working is needed for any question it must be shown with the answer.

Omission of essential working will result in loss of marks.

The use of an approved scientific calculator is expected, where appropriate.

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.

For π , use either your calculator value or 3.142, unless the question requires the answer in terms of π .

The number of marks is given in brackets [] at the end of each question or part question.

The total of the marks for this paper is 90.

	MARKS	
	OBTAINED	FULL
1		2
2		3
3		1
4		2
5		2
6		2
7		3
8		4
9		2
10		4
11		2
12		3
13		3
14		3
15		3
16		6
17		3
18		6
19		3
20		7
21		5
22		8
23		6
24		7
TOTAL		90

This question paper consists of **20** printed pages.

2 *Mathematical Formulae*

Compound interest

$$\text{Total amount} = P \left(1 + \frac{r}{100} \right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi r l$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3} \pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3} \pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2} ab \sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2} r^2 \theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f} \right)^2}$$

Answer **all** the questions.

- 1 Abeny, Becky and Cassidy decided to invest money in the ratio of $p : 2 : 6$.
Becky invested \$16 000 and Cassidy's investment was 20% of the total investment.
Find the value of the total investment.

Answer \$..... [2]

- 2 (a) Given that $\sin x^\circ = 0.8524$, find the two possible values for angle x , where $0 \leq x \leq 180$.

Answer $^\circ$ or $^\circ$ [2]

- (b) Convert 1.54 radians into degrees.

Answer $^\circ$ [1]

- 3 The time taken to paint a wall is inversely proportional to the number of workers.
Five workers take 14 hours.
Find the number of hours it would take for 7 workers to paint the wall.

Answer hours [1]

- 4 Given that $3^{4n-3} = 3^{2026} - 2(3^{2025})$, find the value of n .

Answer $n = \dots\dots\dots$ [2]

- 5 Mr Wong invested \$15000 in a savings account that offers 2% interest per annum, compounded every 3 months.
Calculate the total amount of interest Mr Wong earned at the end of 5 years.

Answer \$..... [2]

- 6 (a) Given that $A = 2^{n+2} \times 3^4 \times 5$ and $B = 2^5 \times 3^{n-1} \times 7^2$ where n is a positive integer.
The greatest common factor of A and B is 48.
Find the value of n .

Answer $n = \dots\dots\dots$ [1]

- (b) Explain why 1 is not a prime number.

Answer
..... [1]

- 7 Explain why $3^{x+2} + 5\left(\frac{1}{3}\right)^{-x} - 4\sqrt{9^x}$ is divisible by 10 for all integer values of x .

Answer

[3]

- 8 (a) Factorise completely $2x^2 + x - 6$.

Answer [2]

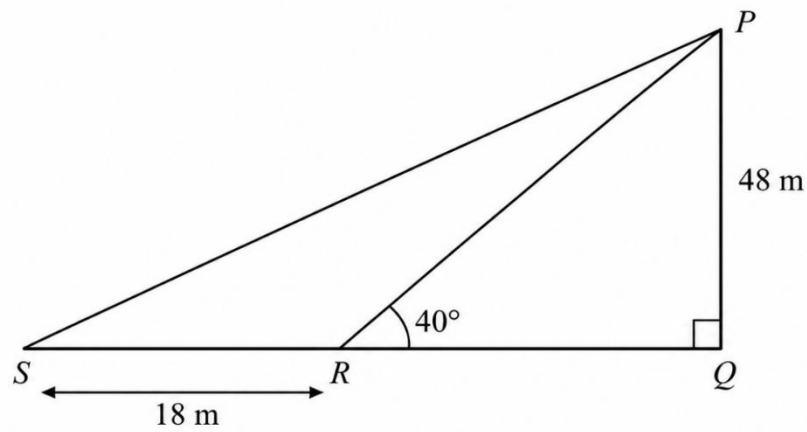
- (b) Hence factorise completely $2(y-3)^2 + (y+4) - 13$.
Write your answer as simply as possible.

Answer [2]

-
- 9 Cheryl went to Europe for a holiday and bought a bag for 900 Euros.
She then sold the bag to her friend at a 15% profit.
Given that the conversion rate between Singapore dollars (\$) and Euros (€) was $\$1 = 0.67$ (€),
calculate the selling price in Singapore dollars (\$).

Answer \$..... [2]

10



The diagram represents a building, PQ , built on horizontal ground.

The height of the building is 48 m.

From a point R , the angle of elevation of the top of the tower is 40° .

Point S is 18 m from R and QRS is a straight line.

Calculate the angle of depression of point S from the top of the building.

Answer $^\circ$ [4]

- 11** Alex has 168 one-centimetre cubes.
 He arranges all the cubes into a cuboid.
 The perimeter of the top of the cuboid is 26 cm.
 Each side of the cuboid has a length greater than 2 cm.
 Find the height of the cuboid.

Answer [2]

- 12 (a) Express $x^2 + 6x + 10$ in the form $(x + p)^2 + q$, where p and q are constants to be found.

Answer [2]

- (b) Write down the coordinates of the minimum point of the graph of $y = x^2 + 6x + 10$.

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

- 13 The curve $y = ax^2 + bx + c$ passes through the points $(-1, -16)$ and $(1, 0)$.
The equation of the line of symmetry of the curve is $x = 2$.
Find the values of a , b and c .

Answer $a = \dots\dots\dots b = \dots\dots\dots c = \dots\dots\dots$ [3]

14 Simplify $\left(\sqrt{\frac{16}{9x^8}}\right)^{-1} + \left(\frac{x^5}{32}\right)^{0.8}$.

Answer [3]

15 Factorise completely $x^3 - x^2y - xy^2 + y^3$.

Answer [3]

16 A bag contains n red marbles and 2 blue marbles.

Three marbles are drawn from the bag at random, one after another without replacement.

The probability that three of the marbles drawn are red is $\frac{1}{5}$.

(a) Show that n satisfies the equation $2n^2 - 9n + 4 = 0$.

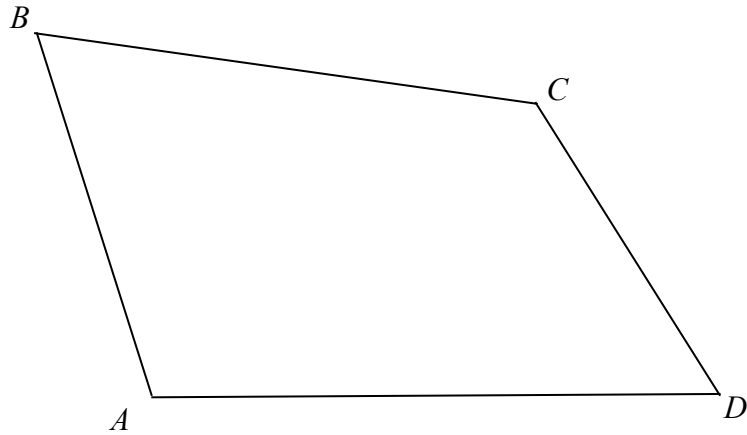
Answer

[3]

(b) Hence, find the probability that at least two marbles drawn are red.

Answer [3]

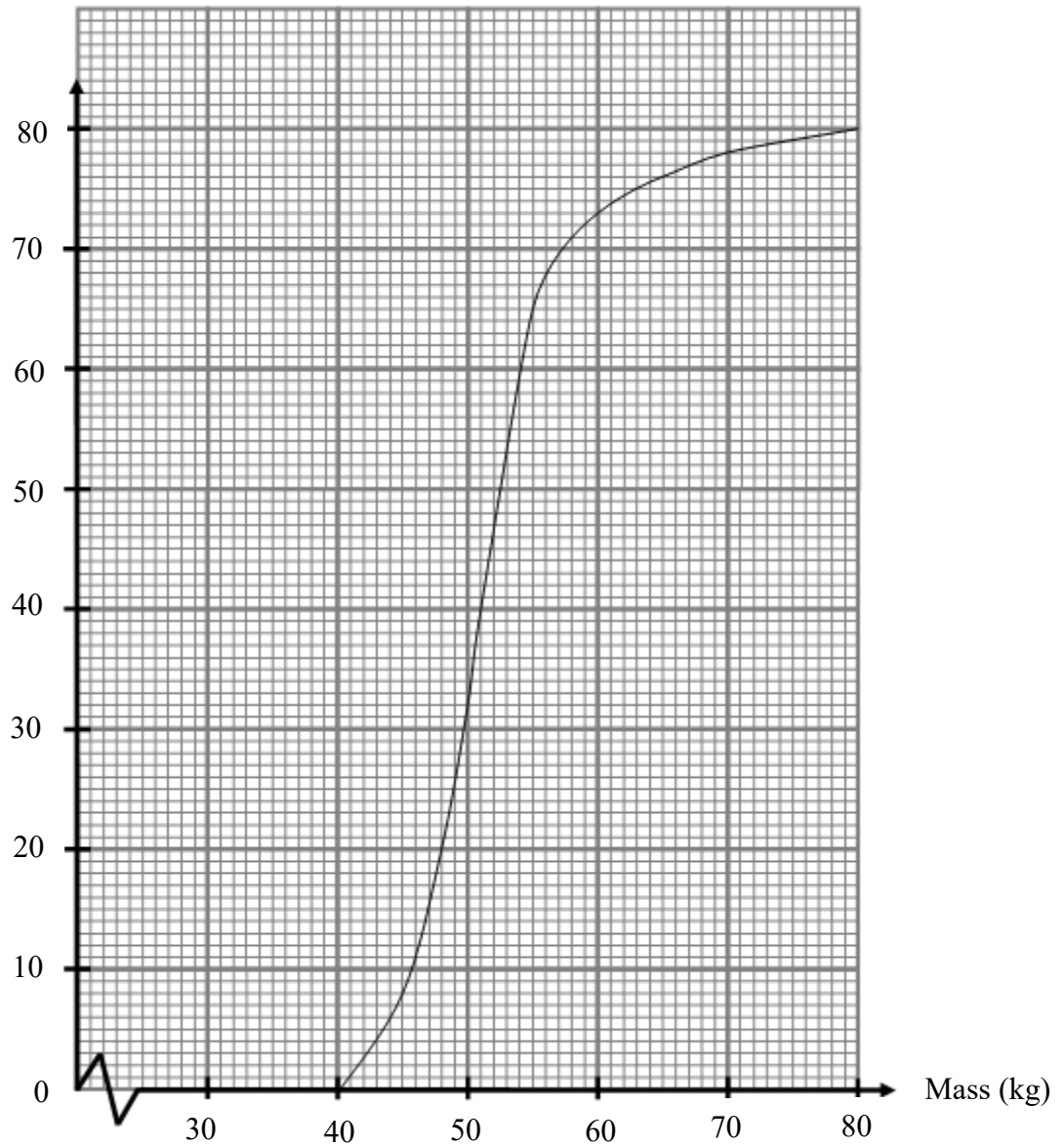
17 The diagram represents a plot of land, $ABCD$.



- (a) Construct the perpendicular bisector of AD . [1]
- (b) Construct the bisector of angle BAD . [1]
- (c) A supermarket is to be built within $ABCD$, nearer to AD than AB and nearer to A than D .
Shade the region where the supermarket is to be built. [1]

- 18 The mass of 80 students are measured and presented in the cumulative frequency diagram below.

Cumulative Frequency



Use the diagram to estimate

- (a) the median mass of the students,

Answerkg [1]

- (b) the interquartile range of the mass,

Answerkg [2]

- (c) the percentage of students whose mass are at least 70 kg.

Answer% [1]

- (d) One student is chosen at random.
Find the probability that the student's mass is between 45 kg and 65 kg.

Answer [2]

19 Two sets P and Q are such that $P \subset Q$.

- (a) Fill in each box with one of the following:

$\emptyset$ $\cup$ $\cap$ P Q P' Q'

(i) $(P \cap Q)$ $(P' \cap Q) = Q$ [1]

(ii) $(P' \cup Q)' =$ [1]

- (b) Andy claims “ $A \cap B = \emptyset$, then $A \subset B'$.”
Do you agree with Andy?
Justify your answer with explanation.

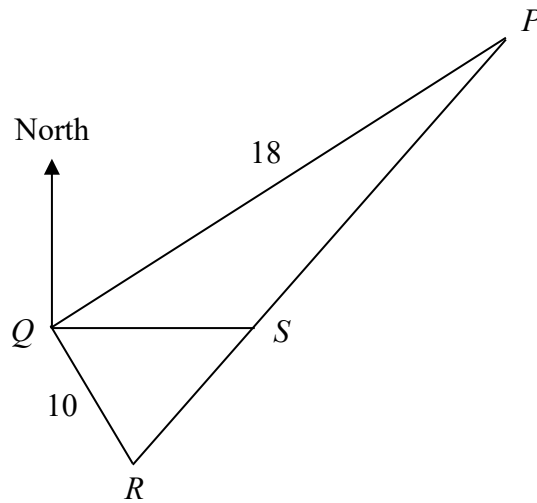
Answer
..... [1]

20 P, Q, R, S are points on horizontal grounds.

$PQ = 18$ km, $QR = 10$ km and the bearing of P from Q is 038° .

S is to the East of Q .

The area of triangle SQR is half the area of triangle SQP .



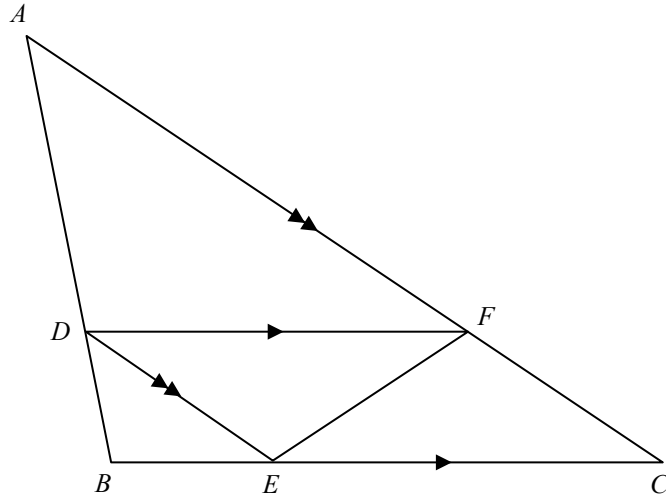
(a) Find the angle SQR .

Answer $^\circ$ [4]

(b) Calculate the distance PR.

Answerkm [3]

- 21 In the diagram, ABC is a triangle. DF is parallel to BC and AC is parallel to DE .



- (a) Prove that triangles ADF and ABC are similar.
Give a reason for each statement you make.

Answer

.....

.....

.....

..... [2]

- (b) Name two triangles that are congruent and show that they are congruent.
Give a reason for each statement you make.

Answer

.....

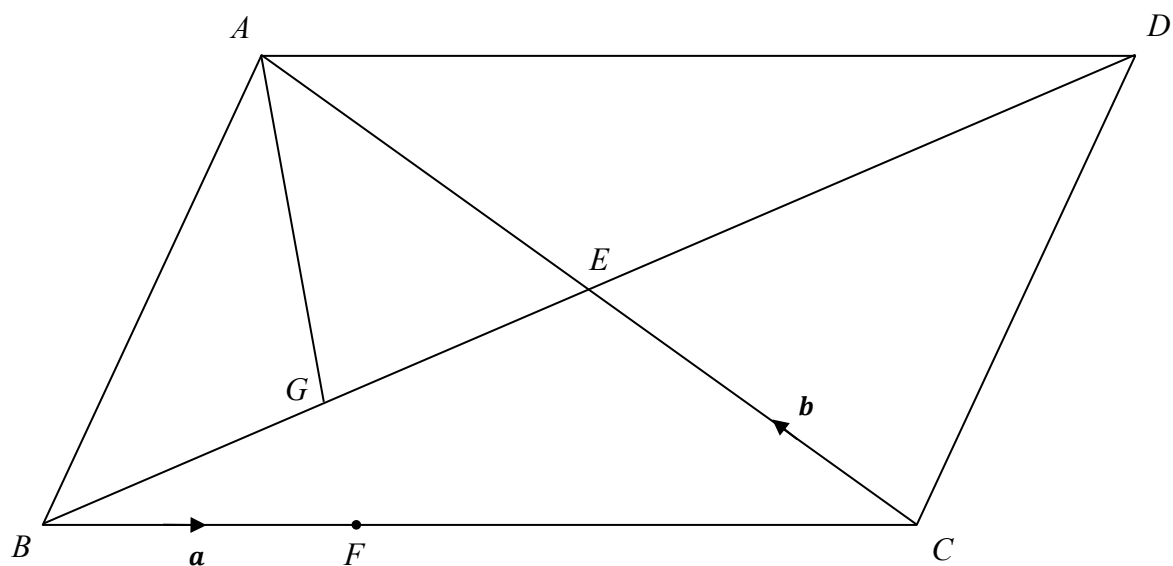
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..... [3]

- 22** In the diagram, $ABCD$ is a parallelogram.
 Diagonals AC and BD intersect at E and G is the midpoint of BE .
 F is a point of BC such that $\overrightarrow{BC} = 3\overrightarrow{BF}$.
 It is given that $\overrightarrow{BF} = \mathbf{a}$ and $\overrightarrow{CE} = \mathbf{b}$.



- (a)** Express each of the following vectors in terms of $\mathbf{a}$ and $\mathbf{b}$ as simply as possible.
- (i)** $\overrightarrow{BA}$

Answer [1]

- (ii)** $\overrightarrow{BD}$

Answer [1]

- (iii)** $\overrightarrow{AG}$

Answer [2]

- (b) Show that points A , G and F are collinear.

Answer

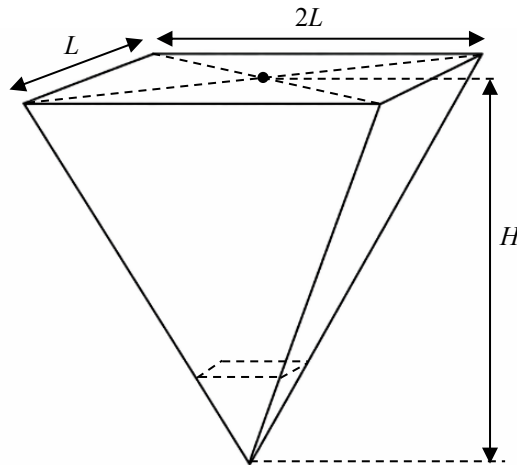
[2]

- (c) Find the value of $\frac{\text{area of } \triangle BFG}{\text{area of } ABCD}$.

Answer [2]

- 23** A closed container is in the shape of an inverted right pyramid with a rectangular base. The dimensions of the base are $2L$ cm by L cm and the vertical height of the pyramid is H cm. The container initially contains some water.

The volume of the water is $\frac{1}{27}$ of the total capacity of the container.

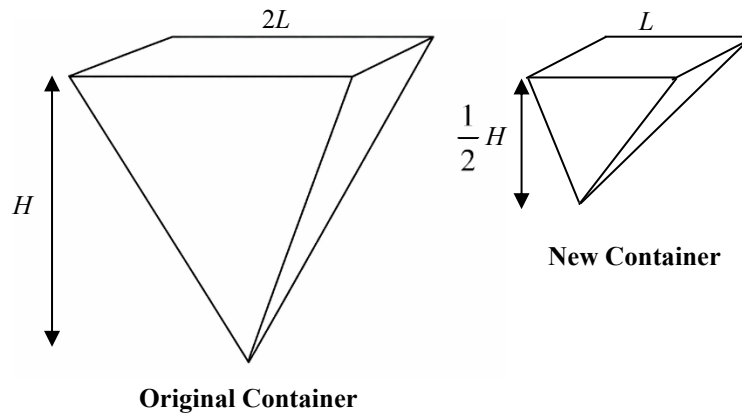


- (a)** Find the area of the rectangular surface of water, in terms of L .

- (b) The container is now inverted so that the rectangular base is at the bottom. Given that the total vertical height of the pyramid H is 90 cm, calculate the new height of the water.
Give your answers to 2 decimal places.

Answercm [3]

(c)



A new container is created, where it has a length L , and a vertical height of $\frac{1}{2}H$.

From the information given, Charles concludes that, “These two containers are similar solids.”
Justify with reason(s) if you agree with Charles claim.

Answer

..... [1]

- 24** Tickets to a concert were sold. The seats were divided into 3 sectors, A , B and C .
 On Friday, 56 Sector A tickets, 84 Sector B tickets and 78 Sector C tickets were sold.
 On Saturday, 62 Sector A tickets, 76 Sector B tickets and 95 Sector C tickets were sold.
- (a) Represent this information in a 2×3 matrix, E .

Answer $E = \dots\dots\dots$ [1]

- (b) The price per ticket is \$20 for Sector A, \$15 for Sector B and \$12 for Sector C.
 Write down a column matrix F to represent the price per seat.

Answer $F = \dots\dots\dots$ [1]

- (c) Evaluate the matrix $G = EF$.

Answer $G = \dots\dots\dots$ [2]

- (d) State what each element of matrix G represents.

Answer [1]

- (e) Using matrix multiplication, find the total amount of money collected from selling all of the tickets.

Answer \$ [2]

21
End of Paper

Answer Key for 2026 YTSS 4G3 Prelims Mathematics P1

1	\$240000	19(c)	I agree with Andy. Sets A and B are disjoint. B' contains every element in the universal set that is not in B . A has no elements in B so every element of A is in B' . Therefore, $A \subset B'$.
2(a)	$x = 58.5^\circ$ or $x = 121.5^\circ$		
2(b)	88.2° (1 d.p.)		
3	10	20(a)	45.2° (1 d.p.)
4	507	20(b)	21.7 km
5	\$1573.43	21(a)	Angle $ADF = \text{Angle } ABC$ (corr angles, $DF \parallel BC$) Angle $DAF = \text{Angle } BAC$ (Common angles) By AA similarity test, triangle ADF and triangle ABC are similar.
6(a)	2		
6(b)	Prime numbers have only 2 distinct factors but 1 only has 1 factor.		
7	Since it is $3^x(10)$, 10 is a factor, it is divisible by 10.	21(b)	Angle $DFE = \text{Angle } CEF$ (alt angles, $DF \parallel CE$) Angle $DEF = \text{Angle } CFE$ (alt angles, $DE \parallel CF$) $EF = EF$ (Common side) By ASA congruence test, triangle CEF is congruent to triangle DFE .
8(a)	$(2x-3)(x+2) \dots A2$		
8(b)	$(2y-9)(y-1)$		
9	SGD1544.78	22(a)(i)	$\overrightarrow{BA} = 3\overrightarrow{a} + 2\overrightarrow{b}$
10	32.5°	22(a)(ii)	$\overrightarrow{BD} = 6\overrightarrow{a} + 2\overrightarrow{b}$
11	4	22(a)(iii)	$\overrightarrow{AG} = -\frac{3}{2}(\overrightarrow{a} + \overrightarrow{b})$
12(a)	$(x+3)^2 + 1$	22(b)	Since $4\overrightarrow{AG} = 3\overrightarrow{AF}$, AG and AF are parallel with A being the common point, A, G and F are on a straight line
12(b)	$(-3, 1)$		
13	$a = -2, b = 8, c = -6$	22(c)	$\frac{1}{24}$
14	$\frac{13x^4}{16}$	23(a)	$\frac{2}{9}L^2$
15	$(x+y)(x-y)^2$	23(b)	1.13 cm
16(b)	$\frac{4}{5}$	23(c)	No, I do not agree as the width of the smaller container may not decrease proportionately thus it is inconclusive.
18(a)	51	24(a)	$E = \begin{pmatrix} 56 & 84 & 78 \\ 62 & 76 & 95 \end{pmatrix}$
18(b)	6	24(b)	$F = \begin{pmatrix} 20 \\ 15 \\ 12 \end{pmatrix}$
18(c)	2.5%		
18(d)	$\frac{17}{20}$	24(c)	$G = \begin{pmatrix} 3316 \\ 3520 \end{pmatrix}$
19(a)	$(P \cap Q) \cup (P' \cap Q) = Q$	24(d)	G represents the total amount of money collected through the sale of tickets for the concert on Friday and Saturday respectively.
19(b)	$(P' \cup Q)' = \emptyset$	24(e)	\$6836