Thank you for subscribing to SmarterMaths Teacher Edition (Silver) in 2019.

The inaugural Standard 2 HSC exam is charting new territory. Smart revision in a difficult landscape is at a premium and as our subscribers have come to expect, plenty of thought has gone into creating this revision resource.

We have put together our "2019 HSC Comprehensive Revision Series" that we recommend motivated students aiming for a Band 5 or 6 result should ***attempt, carefully review and annotate*** in Term 3, creating a concise and high quality revision resource.

Note that our "Final HSC Revision Set" for interested students will be available in early-September in the final stretch before the Standard 2 HSC exam on 25 October, 2019.

Our analysis on each topic, the common question types, past areas of difficulty and recent HSC trends all combine to create an extremely important revision set that ensures students cover a wide cross-section of the key areas we have carefully identified.

IMPORTANT: If students have been exposed to many of the questions in these worksheets during the year, we say great! In sports vernacular, this is where cobwebs are turned into cables through repetition, confidence is built and speed through the paper is developed (an aspect we regard as critical to peak achievement).

HSC Final Study – STD2 Algebra (estimated ~16% of exam)

Key Areas addressed by this worksheet

A1 Formulae and Equations

- harder formula *rearrange* questions of linear equations (note that rearranging non-linear equations is out of the new syllabus);
- substituting given values into both linear and non-linear equations .. poorly answered examples are a focus;
- algebraic fractions – caused significant issues in 2018!
- "find the mistake" questions, historically poorly answered;
- substitution into various dosage formulae – tested in each of the last 5 years in Gen2 course;
- stopping distance calculations – sub-50% mean marks the last 2 times it was examined;
- BAC calculations;
- *distance, speed and time equations (D=S×T)* have attracted tough multiple-choice questions in the past. *2011 Q21 MC* reviews the upper difficulty level of this area.

A2 Linear Relationships

- tested via multiple choice in 4 of the past 5 years, with the notable omission of 2018;
- most common question types reviewed .. identify simple graphs and find gradients;
- pay careful attention to avoid silly errors in this area! (mean marks often sub-50%)
- *Applications of Linear Relationships* - Fuel Consumption (asked 3 of last 5 years) and Currency Conversion reviewed;
- some linear modelling questions in everyday contexts with significant mark allocations are reviewed.

A4 Types of Relationships

- *Simultaneous Equations* are a revision focus. A number of *SM-Bank* (supplementary) questions have been included that reflect both the syllabus changes and the question style of NESA's sample exam documents;
- *Non-Linear: Exponentials/Quadratics* is important, due in large part to the chunky allocations it regularly receives when it does appear - often in cross-topic questions;
- revision of multiple-choice questions that require students to recognise non-linear graphs is covered - examined in over 50% of papers (including 2018 for the first time in 3 years);
- *Non-Linear: Inverse and Other Problems* is well covered as it is almost always poorly answered, particularly the last two times it has been examined in *2018 (Q29c)* and *2014 (Q29a)*.

STANDARD 2:
HSC Comprehensive Revision Series - ALGEBRA

A1 Formulae and Equations (Y11)

A2 Linear Relationships (Y11)

A4 Types of Relationships (Y12)

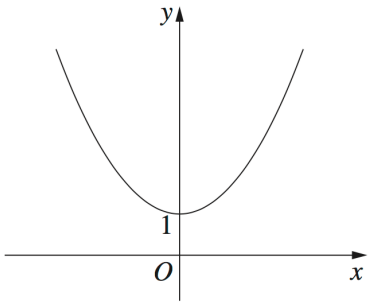
Teacher: Smarter Maths

Exam Equivalent Time: 75 minutes *(based on HSC allocation of 1.5 minutes approx. per mark)*

Questions

1. Algebra, 2UG 2014 HSC 3 MC

The diagram shows the graph of an equation.



Which of the following equations does the graph best represent?

(A) $y = \frac{3}{x} + 1$

(B) $y = 3^x + 1$

(C) $y = 3x^2 + 1$

(D) $y = 3x^3 + 1$

---

2. Algebra, 2UG 2015 HSC 24 MC

Consider the equation $\frac{2x}{3} - 4 = \frac{5x}{2} + 1$.

Which of the following would be a correct step in solving this equation?

(A) $\frac{2x}{3} - 3 = \frac{5x}{2}$

(B) $\frac{2x}{3} = \frac{5x}{2} + 5$

(C) $2x - 4 = \frac{15x}{2} + 3$

(D) $\frac{4x}{6} - 8 = 5x + 2$

---

3. FS Driving, 2UG 2014 HSC 22 MC

Heather's car uses fuel at the rate of 6.6 L per 100 km for long-distance driving and 8.9 L per 100 km for short-distance driving.

She used the car to make a journey of 560 km, which included 65 km of short-distance driving.

Approximately how much fuel did Heather's car use on the journey?

(A) 37 L

(B) 38 L

(C) 48 L

(D) 50 L

---

4. FS Driving, 2UG 2016 HSC 10 MC

Caroline drinks two small bottles of wine over a three-hour period. Each of these bottles contains 2.3 standard drinks. Caroline weighs 53 kg.

Using the formula below, what is Caroline's approximate blood alcohol content (BAC) at the end of this period?

$$\text{BAC}_{\text{Female}} = \frac{10\text{N} - 7.5\text{H}}{5.5\text{M}}$$

where N is the number of standard drinks consumed

H is the number of hours drinking

M is the person's mass in kilograms

(A) 0.081

(B) 0.065

(C) 0.0017

(D) 0.0014

---

5. Algebra, 2UG 2010 HSC 7 MC

If $\text{M} = -9$, what is the value of $\dfrac{3\text{M}^2 + 5\text{M}}{6}$

(A) -250.5

(B) -48

(C) 33

(D) 235.5

---

6. FS Driving, 2UG 2011 HSC 21 MC

A train departs from Town A at 3.00 pm to travel to Town B. Its average speed for the journey is 90 km/h, and it arrives at 5.00 pm. A second train departs from Town A at 3.10 pm and arrives at Town B at 4.30 pm.

What is the average speed of the second train?

(A) 135 km/h

(B) 150 km/h

(C) 216 km/h

(D) 240 km/h

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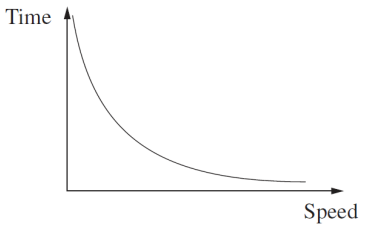
7. Algebra, 2UG 2009 HSC 16 MC

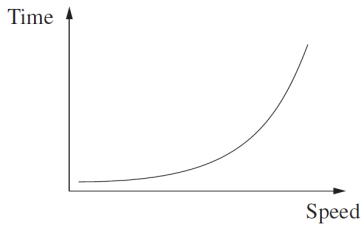
The time for a car to travel a certain distance varies inversely with its speed.

Which of the following graphs shows this relationship?

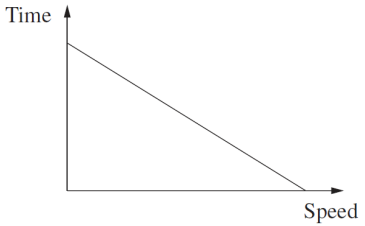
(A)



(B)



(C)



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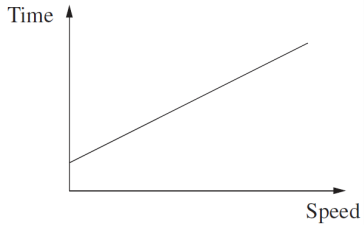

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8. Algebra, 2UG 2010 HSC 13 MC

The number of hours that it takes for a block of ice to melt varies inversely with the temperature. At 30°C it takes 8 hours for a block of ice to melt.

How long will it take the same size block of ice to melt at 12°C?

(A) 3.2 hours

(B) 20 hours

(C) 26 hours

(D) 45 hours

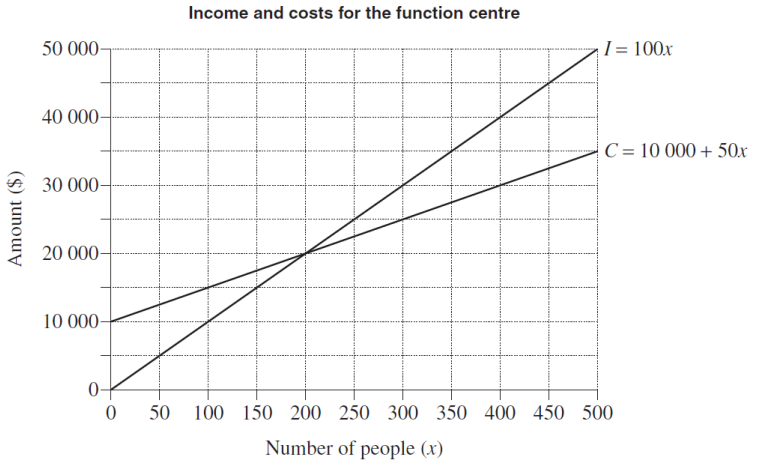
9. Algebra, 2UG 2011 HSC 20 MC

A function centre hosts events for up to 500 people. The cost C, in dollars, for the centre to host an event, where x people attend, is given by:

$$C = 10\,000 + 50x$$

The centre charges $100 per person. Its income I, in dollars, is given by:

$$I = 100x$$



How much greater is the income of the function centre when 500 people attend an event, than its income at the breakeven point?

(A) $15 000

(B) $20 000

(C) $30 000

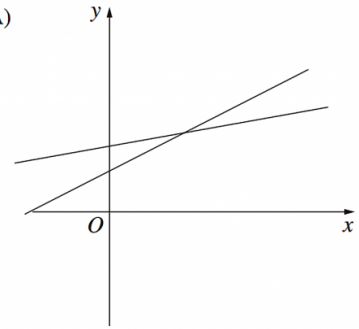
(D) $40 000

10. Algebra, 2UG 2004 HSC 16 MC

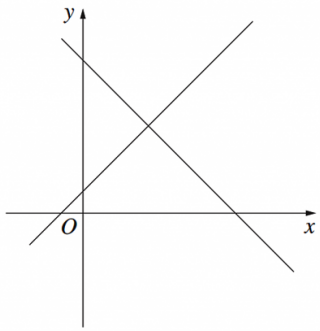
George drew a correct diagram that gave the solution to the simultaneous equations $y = 2x - 5$ and $y = x + 6$.

Which diagram did he draw?

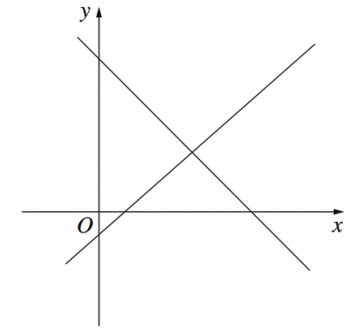
(A)



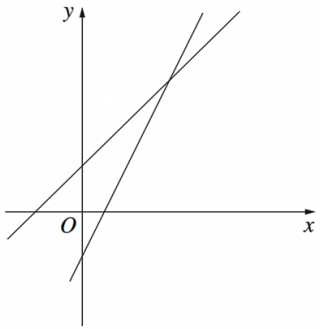
(B)



(C)



(D)



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11. Algebra, 2UG 2004 HSC 22 MC

John knows that

- one Australian dollar is worth 0.62 euros
- one Vistabella dollar ($\$V$) is worth 1.44 euros.

John changes 25 Australian dollars to Vistabella dollars.

How many Vistabella dollars will he get?

(A) $\$V10.76$

(B) $\$V22.32$

(C) $\$V28.00$

(D) $\$V58.06$

---

12. Algebra, 2UG 2005 HSC 17 MC

The total cost, $\$C$, of a school excursion is given by $C = 2n + 5$, where n is the number of students.

If three extra students go on the excursion, by how much does the total cost increase?

(A) $\$6$

(B) $\$11$

(C) $\$15$

(D) $\$16$

---

13. Algebra, 2UG 2007 HSC 15 MC

If pressure (p) varies inversely with volume (V), which formula correctly expresses p in terms of V and k, where k is a constant?

(A) $p = \dfrac{k}{V}$

(B) $p = \dfrac{V}{k}$

(C) $p = kV$

(D) $p = k + V$

---

14. Algebra, 2UG 2007 HSC 19 MC

Which of the following correctly expresses T as the subject of $B = 2\left(R + \frac{T}{2}\right)$?

(A) $T = \frac{B}{2} - 2R$

(B) $T = \frac{B}{2} - R$

(C) $T = 2R - \frac{B}{2}$

(D) $T = \frac{B}{4} - \frac{R}{2}$

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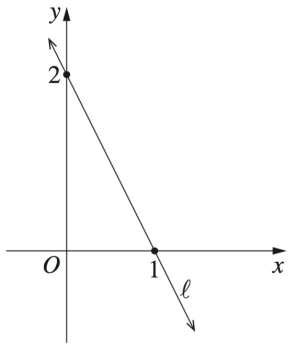
15. Algebra, 2UG 2015 HSC 13 MC

What is the equation of the line l?



(A) $y = -2x + 2$

(B) $y = 2x + 2$

(C) $y = -\frac{x}{2} + 2$

(D) $y = \frac{x}{2} + 2$

---

16. FS Health, 2UG 2014 HSC 4 MC

Young's formula below is used to calculate the required dosages of medicine for children aged 1–12 years.

$$\text{Dosage} = \frac{\text{age of child (in years)} \times \text{adult dosage}}{\text{age of child (in years)} + 12}$$

How much of the medicine should be given to an 18-month-old child in a 24-hour period if each adult dosage is 45 mL? The medicine is to be taken every 6 hours by both adults and children.

(A) 5 mL

(B) 20 mL

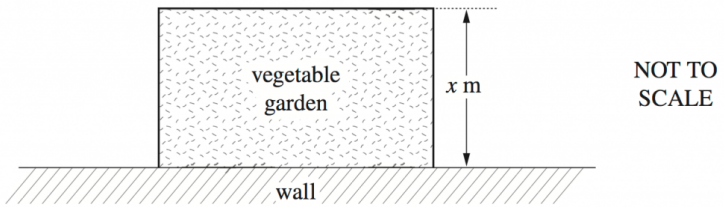
(C) 27 mL

(D) 30 mL

---

17. Algebra, 2UG 2013 HSC 22 MC

Leanne wants to build a rectangular vegetable garden in her backyard. She has 20 metres of fencing and will use a wall as one side of the garden. The plan for her garden is shown, where x metres is the width of her garden.



Which equation gives the area, A, of the vegetable garden?

(A) $A = 10x - x^2$

(B) $A = 10x - 2x^2$

(C) $A = 20x - x^2$

(D) $A = 20x - 2x^2$

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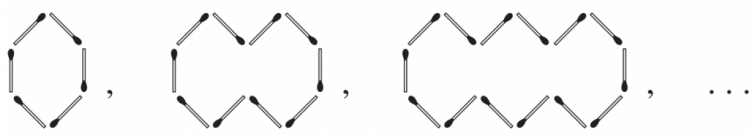
18. Algebra, 2UG 2007 HSC 18 MC

Chris started to make this pattern of shapes using matchsticks.



Shape 1 Shape 2 Shape 3

If the pattern of shapes is continued, which shape would use exactly 486 matchsticks?

(A) Shape 96

(B) Shape 97

(C) Shape 121

(D) Shape 122

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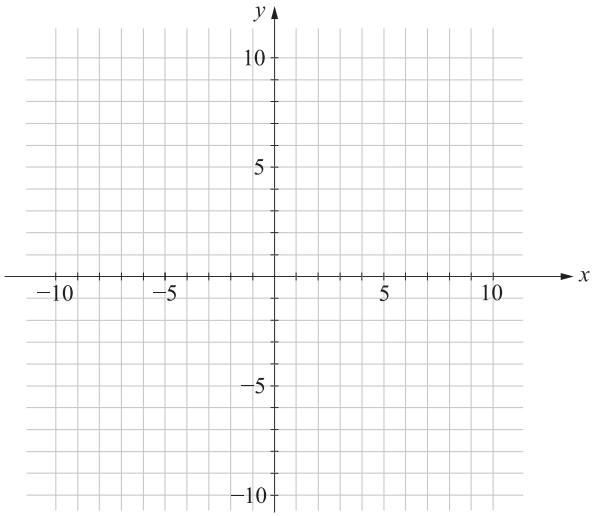
19. Algebra, STD2 2014 HSC 26d

Draw each graph on the grid below and hence solve the simultaneous equations. *(3 marks)*

$$y = 2x + 1$$

$$x - 2y - 4 = 0$$ *(3 marks)*



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20. Algebra, STD2 A2 SM-Bank 03

The average height, C, in centimetres, of a girl between the ages of 6 years and 11 years can be represented by a line with equation

$$C = 6A + 79$$

where A is the age in years. For this line, the gradient is 6.

(i) What does this indicate about the heights of girls aged 6 to 11? *(1 mark)*

(i) Give ONE reason why this equation is not suitable for predicting heights of girls older than 12. *(1 mark)*

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21. Algebra, 2UG 2009 HSC 28c

The height above the ground, in metres, of a person's eyes varies directly with the square of the distance, in kilometres, that the person can see to the horizon.

A person whose eyes are 1.6 m above the ground can see 4.5 km out to sea.

How high above the ground, in metres, would a person's eyes need to be to see an island that is 15 km out to sea? Give your answer correct to one decimal place. *(3 marks)*

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22. Algebra, 2UG 2013 HSC 29a

Sarah tried to solve this equation and made a mistake in Line 2.

$$\frac{W+4}{3} - \frac{2W-1}{5} = 1 \quad \text{..... Line 1}$$

$$5W + 20 - 6W - 3 = 15 \quad \text{..... Line 2}$$

$$17 - W = 15 \quad \text{..... Line 3}$$

$$W = 2 \quad \text{..... Line 4}$$

Copy the equation in Line 1 into your writing booklet and continue your solution to solve this equation for W.

Show all lines of working. *(2 marks)*

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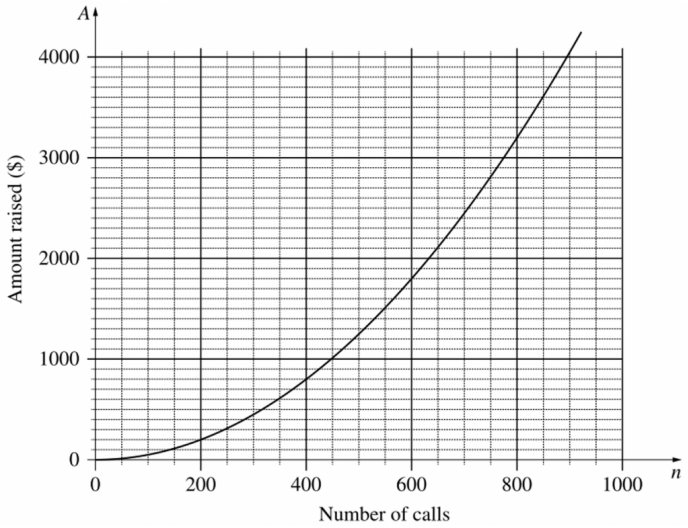
23. Algebra, 2UG 2015 HSC 28f

A charity seeks to raise money by telephoning people at random from a call centre and asking them to donate.

Over the years, this charity has found that the amount of money raised $(\$A)$ is related to the number of telephone calls made (n). A graph of this relationship is shown.



It costs the charity \$2100 per week to run the call centre. It also costs an average of 50 cents per telephone call.

(i) Write an equation to represent the total cost, C, of running the call centre for a week in which n phone calls are made. *(1 mark)*

(ii) By graphing this equation on the axes above, determine the number of phone calls the charity needs to make in order to break even. *(2 marks)*

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24. Algebra, 2UG 2018 HSC 28b

Solve the equation $\frac{2x}{5} + 1 = \frac{3x + 1}{2}$, leaving your answer as a fraction. *(3 marks)*

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25. Algebra, STD2 A2 SM-Bank 02

The weight of a steel beam, w, varies directly with its length, ℓ.

A 1200 mm steel beam weighs 144 kg.

Calculate the weight of a 750 mm steel beam. *(2 marks)*

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26. FS Driving, 2UG 2015 HSC 30d

Claire is driving on a motorway at a speed of 110 kilometres per hour and has to brake suddenly. She has a reaction time of 2 seconds and a braking distance of 59.2 metres.

Stopping distance can be calculated using the following formula

$$\text{stopping distance} = \{\text{reaction time distance}\} + \{\text{braking distance}\}$$

What is Claire's stopping distance. *(2 marks)*

---

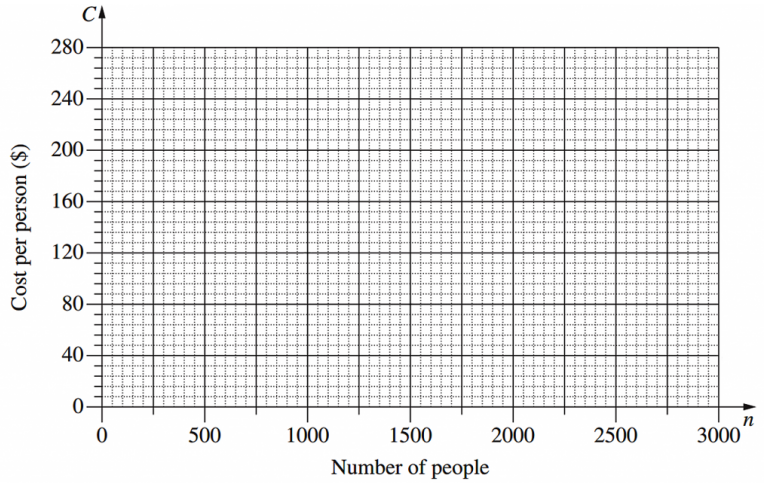
27. Algebra, 2UG 2014 HSC 29a

The cost of hiring an open space for a music festival is $120 000. The cost will be shared equally by the people attending the festival, so that C (in dollars) is the cost per person when n people attend the festival.

(i) Complete the table below by filling in the THREE missing values. *(1 mark)*

Number of people (n)	500	1000	1500	2000	2500	3000
Cost per person (C)				60	48	40

(ii) Using the values from the table, draw the graph showing the relationship between n and C. *(2 marks)*



(iii) What equation represents the relationship between n and C? *(1 mark)*

(iv) Give ONE limitation of this equation in relation to this context. *(1 mark)*

(v) Is it possible for the cost per person to be $94? Support your answer with appropriate calculations. *(1 mark)*

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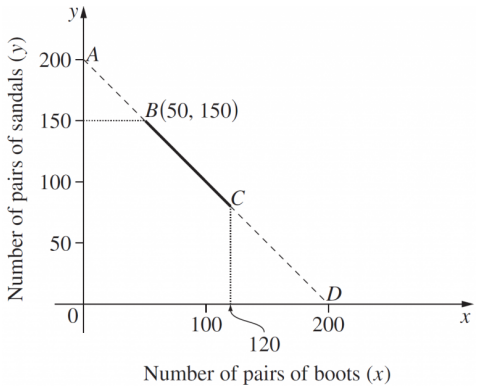
28. Algebra, 2UG 2009 HSC 24d

A factory makes boots and sandals. In any week

- the total number of pairs of boots and sandals that are made is 200
- the maximum number of pairs of boots made is 120
- the maximum number of pairs of sandals made is 150.

The factory manager has drawn a graph to show the numbers of pairs of boots (x) and sandals (y) that can be made.



(i) Find the equation of the line AD. *(1 mark)*

(ii) Explain why this line is only relevant between B and C for this factory. *(1 mark)*

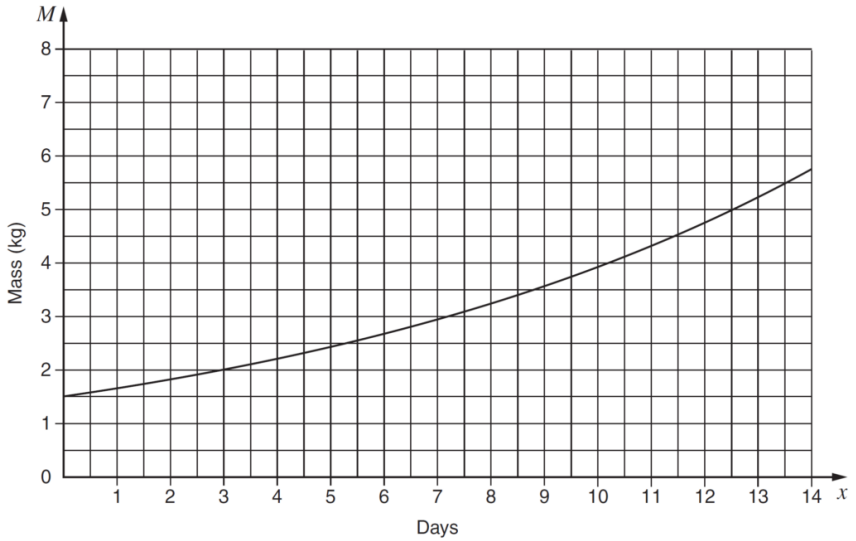
(iii) The profit per week, $\$P$, can be found by using the equation

$$P = 24x + 15y.$$

Compare the profits at B and C. *(2 marks)*

29. Algebra, 2UG 2016 HSC 29b

The mass M kg of a baby pig at age x days is given by $M = A(1.1)^x$ where A is a constant. The graph of this equation is shown.



(i) What is the value of A? *(1 mark)*

(ii) What is the daily growth rate of the pig's mass? Write your answer as a percentage. *(1 mark)*

Worked Solutions

1. Algebra, 2UG 2014 HSC 3 MC

Graph is a parabola that passes through (0, 1)

$\Rightarrow$ C

2. Algebra, 2UG 2015 HSC 24 MC

$$\frac{2x}{3} - 4 = \frac{5x}{2} + 1$$

$$\frac{2x}{3} = \frac{5x}{2} + 5$$

$\Rightarrow$ B

3. FS Driving, 2UG 2014 HSC 22 MC

Fuel used in short distance

$$= \frac{65}{100} \times 8.9 \text{ L} = 5.785 \text{ L}$$

Fuel used in long distance

$$= \frac{495}{100} \times 6.6 \text{ L} = 32.67 \text{ L}$$

$\therefore$ Total Fuel $= 5.785 + 32.67$

$= 38.455$ L

$\Rightarrow$ B

Worked Solutions

4. FS Driving, 2UG 2016 HSC 10 MC

$$\text{BAC}_f = \frac{10\text{N} - 7.5\text{H}}{5.5\text{M}}$$

$$= \frac{10(2 \times 2.3) - 7.5(3)}{5.5 \times 53}$$

$$= 0.0806\ldots$$

$\Rightarrow$ A

5. Algebra, 2UG 2010 HSC 7 MC

$$\frac{3\text{M}^2 + 5\text{M}}{6} = \frac{3 \times (-9)^2 + 5 \times (-9)}{6}$$

$$= \frac{(3 \times 81) - 45}{6}$$

$$= \frac{198}{6}$$

$$= 33$$

$\Rightarrow$ C

♦♦ *Only 31% of students answered correctly!*

6. FS Driving, 2UG 2011 HSC 21 MC

♦ *Mean mark 49%*

1st train

Travels 2hrs at 90km/h

$$\begin{aligned}\text{Distance} &= \text{Speed} \times \text{Time} \\ &= 90 \times 2 \\ &= 180 \text{ km}\end{aligned}$$

2nd train

Travels 180 km in 1 hr 20 min $\left(\frac{4}{3} \text{ hrs}\right)$

$$\begin{aligned}\text{Speed} &= \frac{\text{Distance}}{\text{Time}} \\ &= 180 \div \frac{4}{3} \\ &= 180 \times \frac{3}{4} \\ &= 135 \text{ km/h}\end{aligned}$$

$\Rightarrow$ A

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7. Algebra, 2UG 2009 HSC 16 MC

♦ *Mean mark 38%*

$$T \propto \frac{1}{S}$$

$$T = \frac{k}{S}$$

As S $\uparrow$, T $\downarrow$ $\Rightarrow$ cannot be B or D

C is incorrect because it graphs a linear relationship

$\Rightarrow$ A

---

8. Algebra, 2UG 2010 HSC 13 MC

♦ *Mean mark 50%*

$$\text{Time to melt (T)} \propto \frac{1}{\text{Temp}}$$

$$\Rightarrow T = \frac{k}{\text{Temp}}$$

When $T = 8$ hrs, $\text{Temp} = 30$

$$\begin{aligned}8 &= \frac{k}{30} \\ k &= 240\end{aligned}$$

When $\text{Temp} = 12$

$$\begin{aligned}T &= \frac{240}{12} \\ &= 20 \text{ hours}\end{aligned}$$

$\Rightarrow$ B

---

9. Algebra, 2UG 2011 HSC 20 MC

♦ *Mean mark 50%*

COMMENT: Students can read the income levels directly off the graph to save time and then check with the equations given.

When $x = 500$, $I = 100 \times 500 = \$50\,000$

Breakeven when $x = 200$ (from graph)

When $x = 200$, $I = 100 \times 200 = \$20\,000$

$$\begin{aligned}\text{Difference} &= 50\,000 - 20\,000 \\ &= \$30\,000\end{aligned}$$

$\Rightarrow$ C

---

10. Algebra, 2UG 2004 HSC 16 MC

By elimination

$y = 2x - 5$ cuts the y-axis at -5

$\therefore$ Cannot be A or B

$y = x + 6$ cuts the y-axis at 6

AND has a positive gradient

$\therefore$ Cannot be C

$\Rightarrow$ D

---

11. Algebra, 2UG 2004 HSC 22 MC

John has 25 Aust dollars.

Converting to Euros

$$25 \text{ Aust} = 25 \times 0.62$$
$$= 15.5 \text{ Euros}$$

Converting to Vistabella dollars

$$15.5 \text{ Euros} = \frac{15.5}{1.44}$$
$$= \$V10.76$$

$\Rightarrow$ A

---

12. Algebra, 2UG 2005 HSC 17 MC

$C = 2n + 5$

If n increases to $n + 3$

$$C = 2(n + 3) + 5$$
$$= 2n + 6 + 5$$
$$= 2n + 11$$

$\therefore$ Total cost increases by \$6

$\Rightarrow$ A

---

13. Algebra, 2UG 2007 HSC 15 MC

$$p \propto \frac{1}{V}$$
$$p = \frac{k}{V}$$

$\Rightarrow$ A

---

14. Algebra, 2UG 2007 HSC 19 MC

$$B = 2\left(R + \frac{T}{2}\right)$$
$$\frac{B}{2} = R + \frac{T}{2}$$
$$\frac{T}{2} = \frac{B}{2} - R$$
$$T = \frac{B}{2} - 2R$$

$\Rightarrow$ A

---

15. Algebra, 2UG 2015 HSC 13 MC

l passes through (0, 2) and (1, 0)

$$\text{Gradient} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{0 - 2}{1 - 0}$$

$$= -2$$

y intercept = 2

$\therefore y = -2x + 2$

$\Rightarrow$ A

♦ *Mean mark 48%.*

16. FS Health, 2UG 2014 HSC 4 MC

$$\text{Dosage} = \frac{1.5 \times 45}{1.5 + 12}$$

$$= 5 \text{ mL}$$

Since 1 dosage every 6 hrs

In 24 hours,

Medicine given $= 4 \times 5 = 20$ mL

$\Rightarrow$ B

♦ *Mean mark 42%*

17. Algebra, 2UG 2013 HSC 22 MC

Length of garden $= (20 - 2x)$

Area $= x(20 - 2x)$

$$= 20x - 2x^2$$

$\Rightarrow$ D

♦♦♦ *Mean mark 24% (lowest mean of any MC question in 2013 exam)*

18. Algebra, 2UG 2007 HSC 18 MC

Shape (S)	1	2	3
Matches (M)	6	10	14

Equation rule

$M = 4S + 2$

Find x when $M = 486$

$486 = 4S + 2$

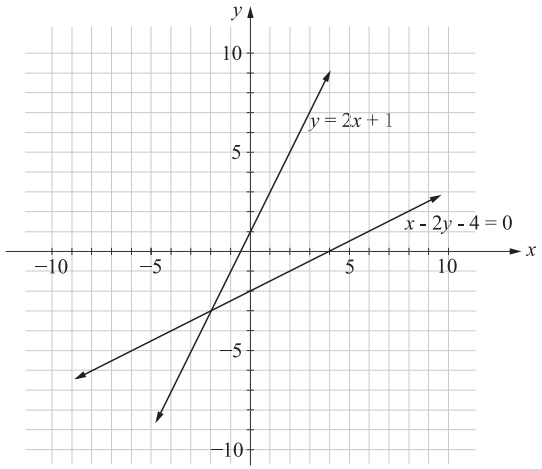
$4S = 484$

$S = 121$

$\therefore$ The 121st shape uses 486 matchsticks.

$\Rightarrow$ C

19. Algebra, STD2 2014 HSC 26d



Solution is at the intersection: $x = -2$, $y = -3$

20. Algebra, STD2 A2 SM-Bank 03

(i) It indicates that 6-11 year old girls, on average, grow 6 cm per year.

(ii) Girls eventually stop growing, and the equation doesn't factor this in.

21. Algebra, 2UG 2009 HSC 28c

$h \propto d^2$

$h = kd^2$

When $h = 1.6, \quad d = 4.5$

$1.6 = k \times 4.5^2$

$\therefore k = \dfrac{1.6}{4.5^2}$

$= 0.07901\ldots$

Find h when $d = 15$

$h = 0.07901\ldots \times 15^2$

$= 17.777\ldots$

$= 17.8$ m (to 1 d.p.)

♦♦ *Mean mark 22%*
CRITICAL STEP: Reading the first line of the question carefully and establishing the relationship $h = kd^2$ is the key part of solving this question.

22. Algebra, 2UG 2013 HSC 29a

$$\frac{W+4}{3} - \frac{2W-1}{5} = 1 \quad \ldots \text{Line 1}$$

$$5W + 20 - 6W + 3 = 15 \quad \ldots \text{Line 2}$$

$$23 - W = 15 \quad \ldots \text{Line 2}$$

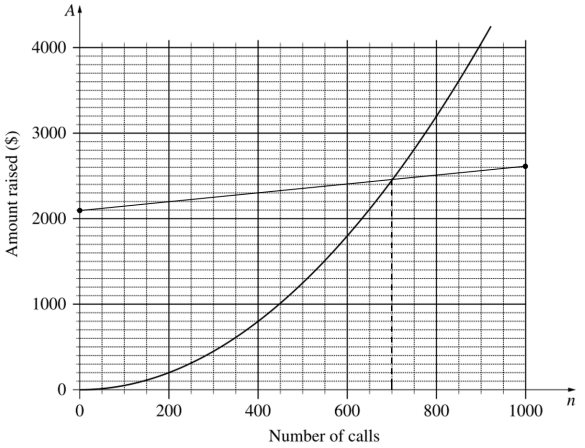
$$W = 8 \quad \ldots \text{Line 4}$$

♦♦ *Mean mark 27%*
STRATEGY: The RHS of the equation increases from 1 to 15 (from Line 1 to Line 2), indicating both sides must have been multiplied by 15.

23. Algebra, 2UG 2015 HSC 28f

i. $C = \$2100 + \$0.50n$

ii.



From the above graph, the charity needs to make 700 calls to break even.

♦ *Mean marks of 48% and 32% for parts (i) and (ii) respectively.*

24. Algebra, 2UG 2018 HSC 28b

$$\underbrace{\frac{2x}{5} + 1}_{\text{multiply x10}} = \underbrace{\frac{3x+1}{2}}_{\text{multiply x10}}$$

$$4x + 10 = 15x + 5$$

$$11x = 5$$

$$x = \frac{5}{11}$$

♦ *Mean mark 35%.*

25. Algebra, STD2 A2 SM-Bank 02

$w \propto \ell$

$w = k\ell$

When $w = 144$ kg, $\ell = 1200$ mm

$144 = k \times 1200$

$k = \dfrac{144}{1200}$

$= \dfrac{3}{25}$

When $\ell = 750$ mm,

$w = \dfrac{3}{25} \times 750$

$= 90$ kg

26. FS Driving, 2UG 2015 HSC 30d

♦ *Mean mark 34%.*

110 km/hr $= 110\,000$ m/hr

$= \dfrac{110\,000}{60 \times 60}$ m/sec

$= 30.555\ldots$ m/sec

Reaction time distance $= 2 \times 30.555\ldots$

$= 61.11\ldots$ metres

$\therefore$ Stopping distance

= Reaction time distance + braking distance

$= 61.11\ldots + 59.2$

$= 120.311\ldots$

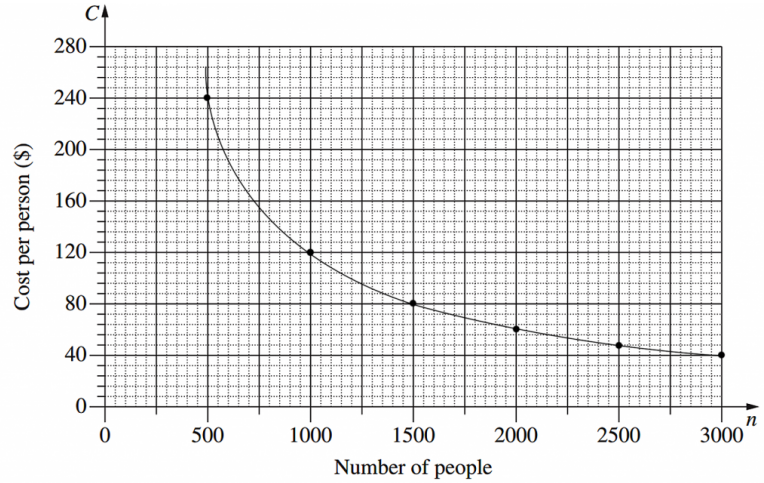
$= 120.3$ metres (to 1 d.p.)

27. Algebra, 2UG 2014 HSC 29a

(i)

Number of people (n)	500	1000	1500	2000	2500	3000
Cost per person (C)	240	120	80	60	48	40

(ii)



(iii) $C = \dfrac{120\,000}{n}$

♦ *Mean mark 48%*

(iv) Limitations can include:

- n must be a whole number
- $C > 0$

♦♦♦ Mean mark 7%
COMMENT: When asked for limitations of an *equation*, look carefully at potential restrictions with respect to *both the domain and range*.

(v) If $C = 94$

$\Rightarrow 94 = \dfrac{120\,000}{n}$

$94n = 120\,000$

$n = \dfrac{120\,000}{94}$

$= 1276.595...$

♦ *Mean mark 38%*

$\therefore$ Cost cannot be \$94 per person,
because n isn't a whole number.

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28. Algebra, 2UG 2009 HSC 24d

(i) We are told the number of boots (x),
and shoes (y), made in any week = 200

$\Rightarrow$ Equation of AD is $x + y = 200$

♦♦♦ *Mean mark part (i) 14%.*
Using $y = mx + b$ is a less efficient but equally valid method, using $m = -1$ and $b = 200$ (y-intercept).

(ii) Since the max amount of boots = 120

$\Rightarrow$ x cannot > 120

♦ *Mean mark 49%*

Since the max amount of sandals = 150

$\Rightarrow$ y cannot > 150

$\therefore$ The line AD is only possible between B and C.

(iii) At B, $x = 50$, $y = 150$

$\Rightarrow$ \$P (at B) $= 24 \times 50 + 15 \times 150$
$= 1200 + 2250$
$= \$3450$

♦ *Mean mark 40%.*

At C, $x = 120, y = 80$

$\Rightarrow$ \$P (at C) $= 24 \times 120 + 15 \times 80$
$= 2880 + 1200$
$= \$4080$

$\therefore$ The profits at C are \$630 more than at B.

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29. Algebra, 2UG 2016 HSC 29b

(i) When $x = 0$,

$1.5 = A(1.1)^0$

$\therefore A = 1.5$ kg

♦ *Mean mark 48%.*

(ii) Daily growth rate
$= 0.1$
$= 10\%$

♦♦♦ *Mean mark part (ii) 6%.*
MARKER'S COMMENT:
Interpretation of the exponential was very poorly understood.
