c) State the natural domain and range of the function graphed in part (b)

$D: \{x : x \in \mathbb{R}, x \neq 0\}$ ✓

$R: \{y : y \in \mathbb{R}, y \neq 1\}$ ✓

d) For the function $w(x) = \frac{3}{4-x} + 2$, determine the

i) equation of any and all asymptotes

Horizontal: $w(x) = 2$ ✓

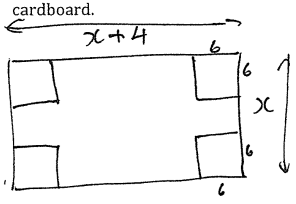
Vertical : $x = 4$ ✓

ii) behaviour of $w(x)$ as $x \to +\infty$

as $x \to +\infty$, $w(x) \to 2$ ✓

Question 11 [4 marks]

A rectangular piece of cardboard is 4 cm longer than it is wide. An open-top box is constructed from the piece of cardboard by cutting a 6 cm square out of each corner and folding the resulting flaps upwards to create the box. If the volume of the box created in this way is 840 cm^3, find the dimensions of the original piece of cardboard.



$V = l \times b \times h = 840$

$\Rightarrow (x+4-12)(x-12) \times 6 = 840$ ✓✓

$(x-8)(x-12) \times 6 = 840$

$\Rightarrow$ CP $\Rightarrow x = -2$ or 22 ✓*

reject

$\Rightarrow$ Dimensions are 22×26 cm ✓

(* OR $(x-6)(x-12) = 140$

$x^2 - 20x + 96 = 140$

$x^2 - 20x - 44 = 0$

$(x+2)(x-22) = 0$)

END OF TEST

YEAR 11 MATHEMATICS METHODS UNIT 1

TEST 3
TERM 2, 2018
Test date: Wed 9th of May

APPLECROSS SENIOR HIGH SCHOOL

STUDENT NAME: _____

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	Total	Result	
Section 1	33		%
Section 2	25		
Total	58		

Section 1: Resource – Free

Working time: 33 minutes

Question 1 [1, 1 = 2 marks]

For the graph of $y = (x+3)^2 - 2$ state:

a) The coordinates of the y-intercept

b) The equation of the line of symmetry

Question 2 [1, 1 = 2 marks]

For the graph of $y = (x+4)(x-2)$ state:

a) The equation of the line of symmetry

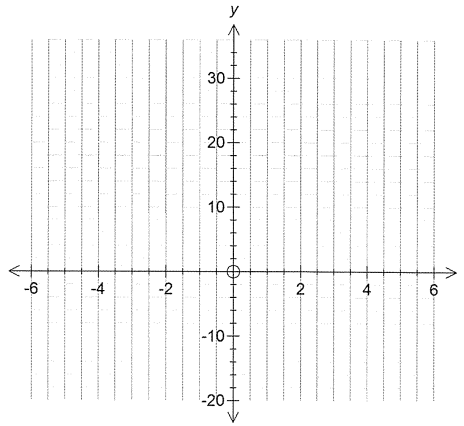
b) The coordinates of the turning point

Question 3 [3 marks]

On the axes shown right, sketch a graph of the function

$y = (x+2)(x-4)^2$

Clearly label all axes intercepts.



Question 4 **[3, 2, 2 = 7 marks]**

Given $g(x)=3x^3-16x^2+23x-6=(x-2)(ax^2+bx+c)$;

a) Find the values of a, b, and c.

b) Hence, fully factorise $g(x)$.

c) Solve the equation $3x^3-16x^2+23x-6=0$.

Question 5 **[4, 2, 2 = 8 marks]**

a) Graph the function $y=x^2-4x-7$ on the axes on the next page below over the range $-2 \leq x \leq 5$, labelling and stating the:

i) line of symmetry,
ii) turning point,
iii) y-intercept.

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SENIOR HIGH SCHOOL

YEAR 11 MATHEMATICS
METHODS UNIT 1

TEST 1
TERM 1, 2018
Test date: Tuesday 20th of February

STUDENT NAME: _____

25

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Section 2: Resource – Rich
Working time: 25 minutes

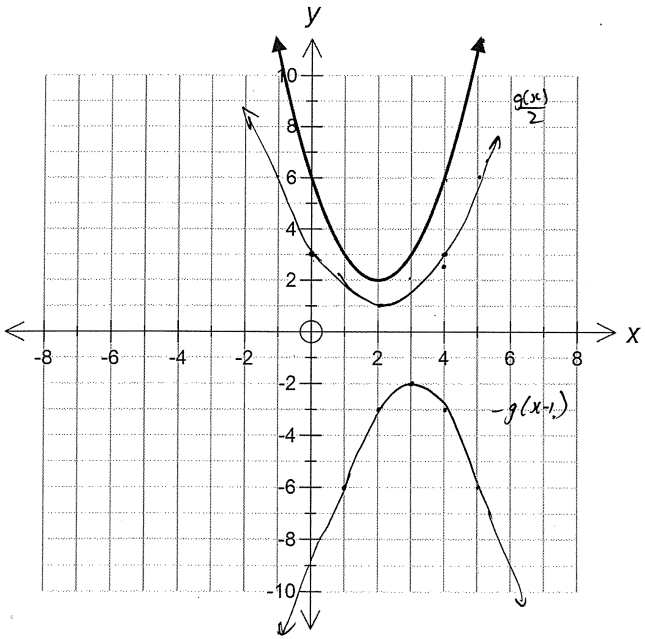
To be provided by the student:
ClassPad and/or Scientific Calculators
1 sheet of A4–sized paper of notes, double-sided

Question 7 **[1, 2 = 3 marks]**

The graph of the function $y=g(x)$ is show on the right. On the same axes, sketch and label graphs of

a) $y=\frac{g(x)}{2}$ ✓

b) $y=-g(x-1)$ translated +1 ✓ reflected ✓



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YEAR 11 MATHEMATICS
METHODS UNIT 1

TEST 1
TERM 1, 2018
Test date: Tuesday 20th of February

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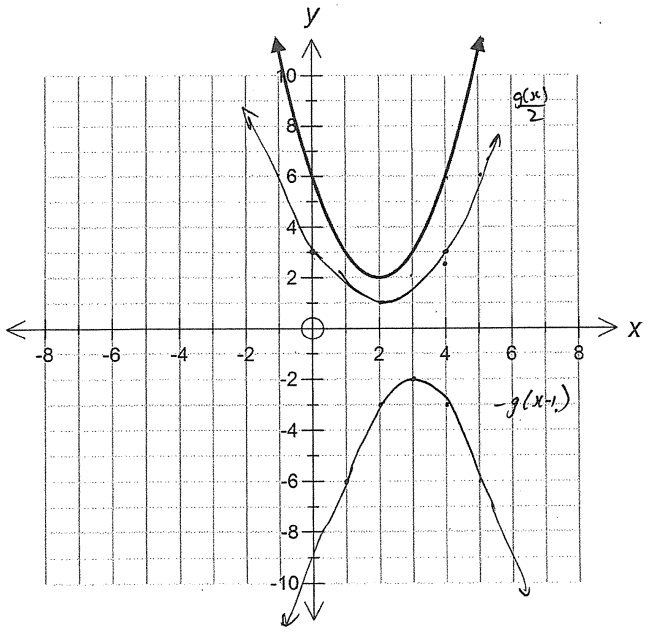
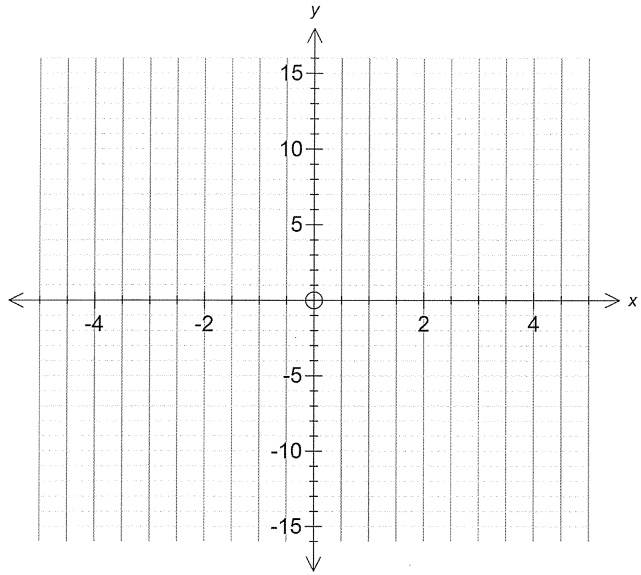
The graph of the function $y = g(x)$ is show on the right. On the same axes, sketch and label graphs of

a) $y = \frac{g(x)}{2}$ ✓

b) $y = -g(x-1)$ translated +1 ✓ reflected ✓



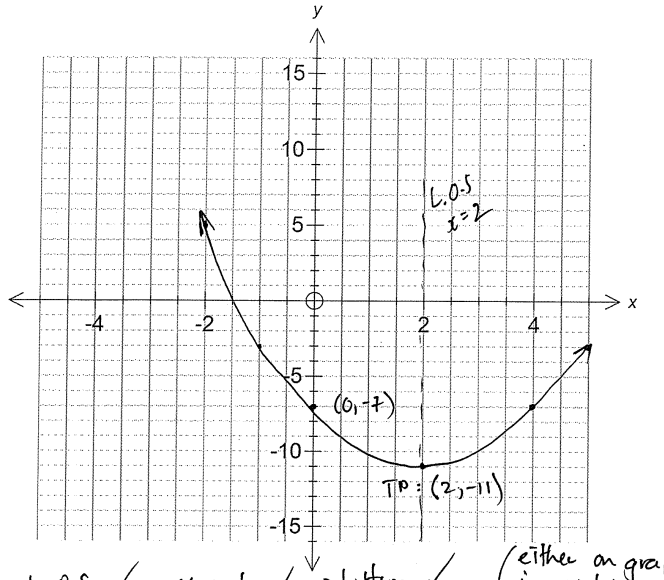


b) Use **the discriminant** to show the equation $y = x^2 - 4x - 7$ has two roots.

c) If the graph is to have only one root, the graph will need to be translated upwards *d* units.

i) What is the value of d?

ii) What is the equation of the new graph?



TP ✓ L.O.S ✓ y-int ✓ plotting ✓ (either on graph or in working OK)

b) Use **the discriminant** to show the equation $y = x^2 - 4x - 7$ has two roots.

$\Delta = b^2 - 4ac = 16 - 4(1)(-7) = 44$ ✓

As $\Delta > 0$, the equation has 2 roots. ✓

c) If the graph is to have only one root, the graph will need to be translated upwards d units.

i) What is the value of d?

11 ✓

ii) What is the equation of the new graph?

$y = x^2 - 4x + 4$ ✓

Question 6 [2, 2, 3, 4 = 11 marks]

Solve the following using any appropriate method or show that there is no real solution. Give exact answers and simplify where possible.

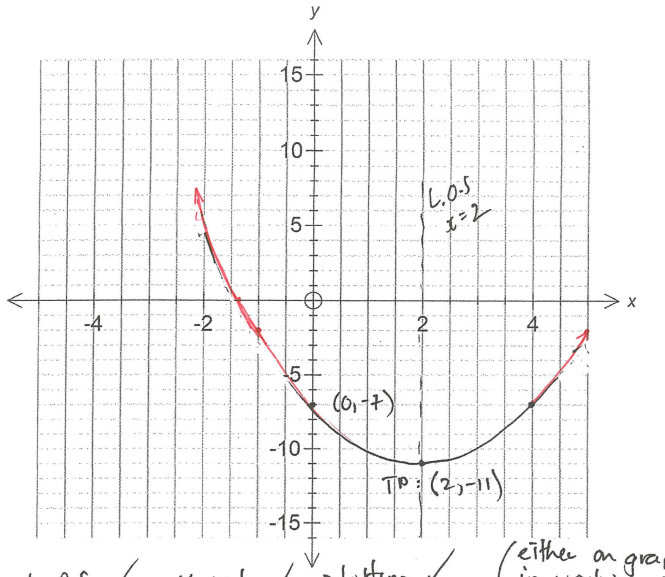
a) $x^2 + 9 = 25$

b) $6x^2 - 11x = -3$

c) $3x^2 - 2x - 2 = 0$

d) $2x^3 - 3x^2 - 8x - 3 = 0$

END OF SECTION 1



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11 ✓

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$y = x^2 - 4x + 4$ ✓

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SENIOR HIGH SCHOOL

YEAR 11 MATHEMATICS
METHODS UNIT 1

Test date: Tuesday 20

STUDENT NAME: _____

25

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Section 2: Resource – Rich

Working time: 25 minutes

To be provided by the student:
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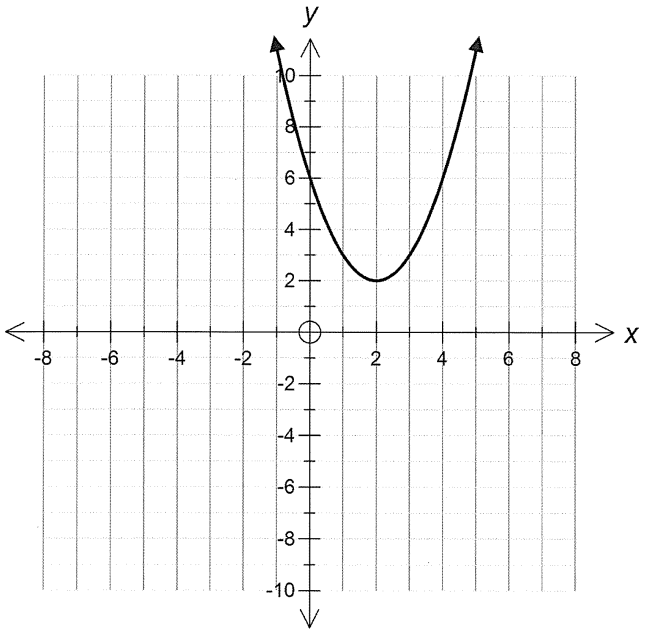
1 sheet of A_4–sized paper of notes, double-sided

Question 7 [1, 2 = 3 marks]

The graph of the function $y = g(x)$ is show on the right. On the same axes, sketch and label graphs of

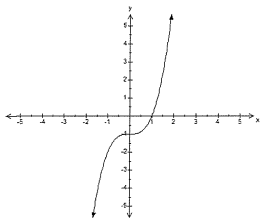
a) $y = \frac{g(x)}{2}$

b) $y = -g(x-1)$

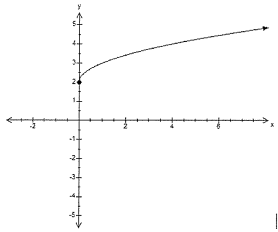


Question 8 [2, 4 = 6 marks]

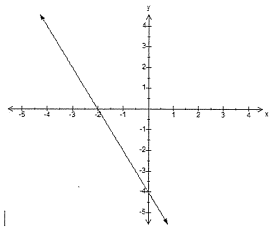
The graphs of 5 functions are shown below.



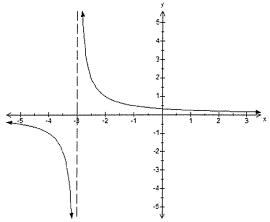
Graph A



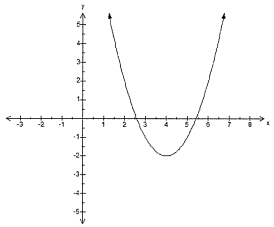
Graph B



Graph C



Graph D



Graph E

a) Match each graph above to its corresponding equation below.

Equation	$y=\frac{1}{x+a}$	$y=b+\sqrt{x}$	$y=(x-c)^2+d$	$y=x^3+e$	$y=fx+g$
Graph					

(b) Find the value of each of the constants a, b, c, d, e, f and g in the equations above.

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YEAR 11 MATHEMATICS METHODS UNIT 1

TEST 3
TERM 2, 2018
Test date: Wed 9th of May

STUDENT NAME: Solution

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Section 1: Resource – Free

Working time: 33 minutes

Question 1 [1, 1 = 2 marks]

For the graph of $y=(x+3)^2-2$ state:

a) The coordinates of the y-intercept

$x=0 \Rightarrow y=7$ $(0,7)$ ✓

b) The equation of the line of symmetry

$x=-3$ ✓

Question 2 [1, 1 = 2 marks]

For the graph of $y=(x+4)(x-2)$ state:

a) The equation of the line of symmetry

$\frac{-4+2}{2}=-1$ $x=-1$ ✓

b) The coordinates of the turning point

$y=(-1+4)(-1-2)=-9$

$(-1,-9)$ ✓

Question 3 [3 marks]

On the axes shown right, sketch a graph of the function

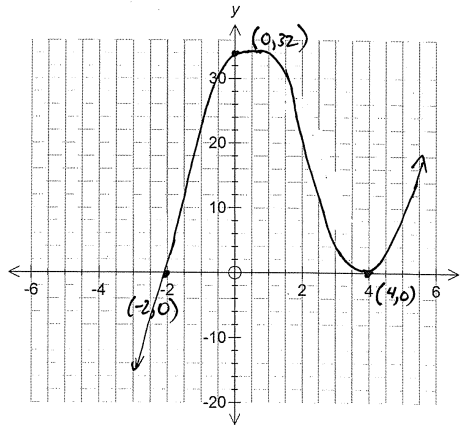
$y=(x+2)(x-4)^2$

Clearly label all axes intercepts.

roots at -2 & 4 ✓

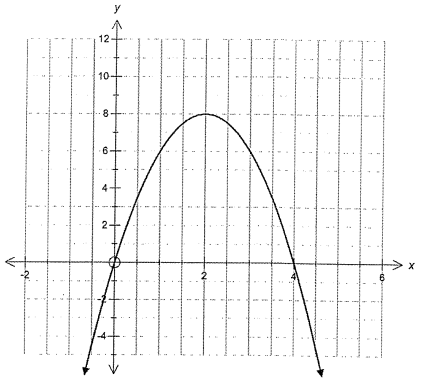
y-int at 32 ✓

Shape/orientation ✓



Question 9 **[3 marks]**

Derive the equation of the function graphed on the right.



T.P @ (2, 8)

$\Rightarrow y = a(x-2)^2 + 8$ ✓

Sub (0,0):

$0 = a(0-2)^2 + 8$

$\Rightarrow 0 = 4a + 8$

$\Rightarrow a = -2$ ✓

$\therefore y = -2(x-2)^2 + 8$ ✓

Question 10 **[2, 2, 2, 2, 1 = 9 marks]**

a) Under certain circumstances, the volume V (in mL) of a given quantity of gas is inversely proportional to its pressure P (in kPa). In a particular experiment, when the pressure was 90 kPa, the volume of gas was 40 mL. What will the volume be when the pressure is increased to 120 kPa?

$V = \frac{k}{P}$

$P = 90, V = 40$

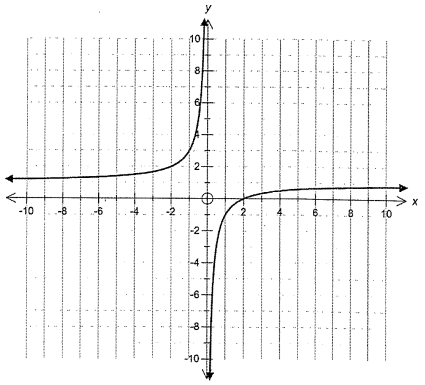
$\Rightarrow 40 = \frac{k}{90} \Rightarrow k = 3600$ ✓

Rule: $V = \frac{3600}{P}$

$P = 120 \Rightarrow V = \frac{3600}{120}$

$= 30\text{mL}$ ✓

b) Identify the equation of the graphed function.



$y = \frac{a}{x} + 1$ ✓

Sub (2,0):

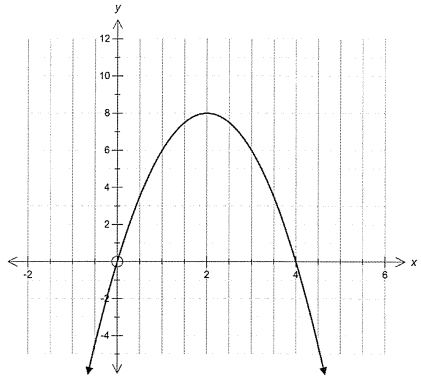
$0 = \frac{a}{2} + 1$

$\Rightarrow a = -2$ ✓

$\therefore y = -\frac{2}{x} + 1$ ✓

Question 9 **[3 marks]**

Derive the equation of the function graphed on the right.



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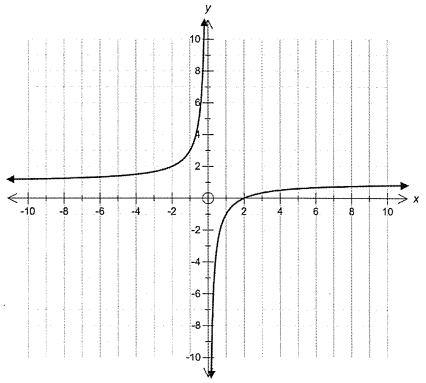

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END OF TEST

APPLECROSS
SENIOR HIGH SCHOOL

YEAR 11 MATHEMATICS METHODS UNIT 1

TEST 3
TERM 2, 2018
Test date: Wed 9th of May

STUDENT NAME: Solution

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