



**Year 12 Mathematics Specialist 2017**  
**Test Number 2: Functions and Graph Sketching**  
**Resource Free**

Name: \_\_\_\_\_ Teacher: DDA

Marks: 20

Time Allowed: 22 minutes

**Instructions:** You **ARE NOT** permitted any notes or calculator. Show your working where appropriate remembering you must show working for questions worth more than 2 marks.

---

**Question 1**

**[3 marks]**

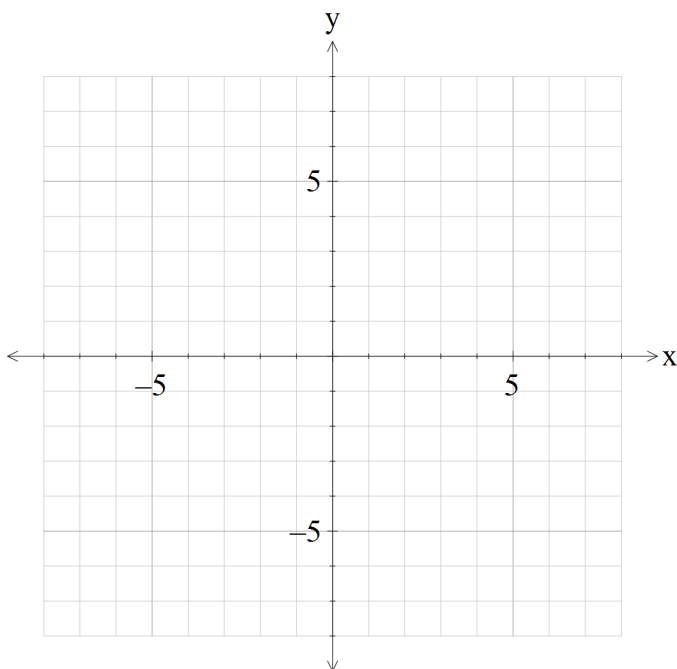
If  $f(x) = 1 + \sqrt{x-2}$  determine the formula for  $f^{-1}(x)$  the inverse of  $f(x)$ , and state its domain and range.

**Question 2****[3 marks]**

State the domain and range of  $g \circ f(x)$  if  $f(x) = 5\sqrt{x}$  and  $g(x) = x^2 + x$ .

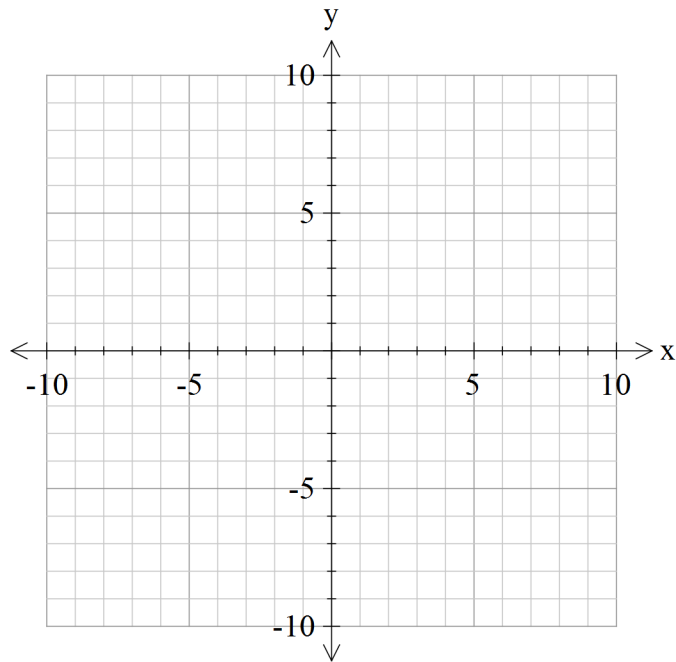
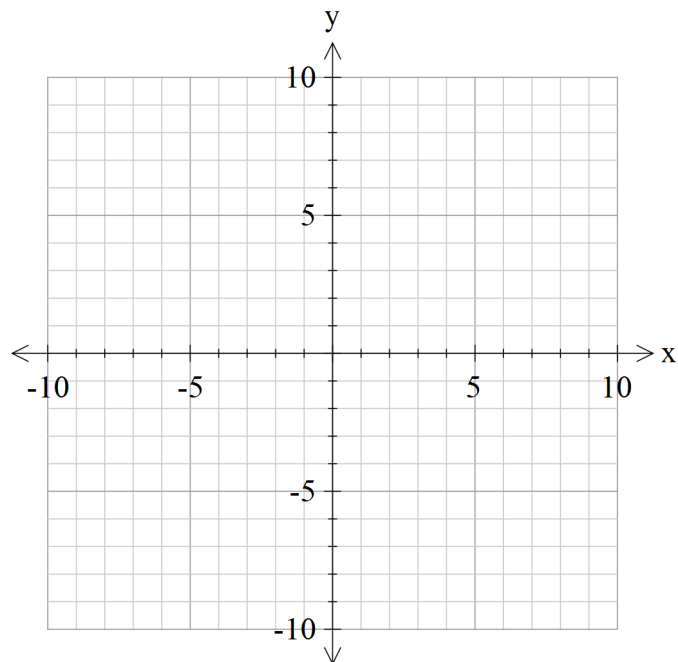
**Question 3****[2, 2, 2, 1 = 7 marks]**

- a) On the graph below accurately draw:  $y = |x - 2|$  and  $y = |x + 4|$   
 b) Using these, or otherwise, draw  $y = |x - 2| - |x + 4|$   
 c) Express this as a piecewise function  $f(x)$ .



$$f(x) = \begin{cases} \text{ } \\ \text{ } \\ \text{ } \end{cases}$$

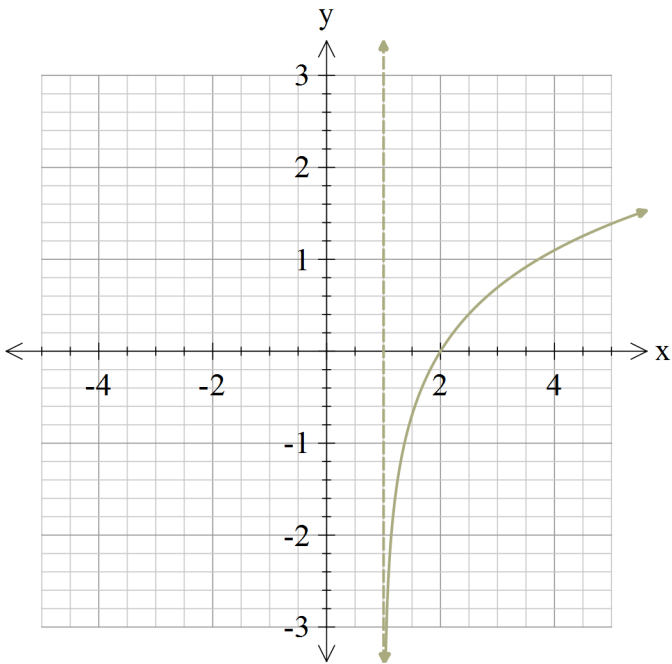
- d) Use your graph to find the values of  $x$  which satisfy:  $|x - 2| - |x + 4| \geq 3$

**Question 4****[2 marks]**Sketch the graph  $y = -|x| + 2$ **Question 5****[2, 1 = 3 marks]**Sketch the graph of  $f(x) = \frac{1}{|x-1|}$ . Write the domain of  $f(x)$ .

Question 6

[2 marks]

Sketch the graph of  $y=f(|x|)$  given that  $f(x)$  is shown on the graph below.





## Year 12 Mathematics Specialist 2017

### Test Number 2: Functions and Graph Sketching

#### Resource Rich

Name: \_\_\_\_\_ Teacher: DDA

Marks: 20

Time Allowed: 23 minutes

**Instructions:** You are permitted 1 A4 pages of notes and your calculators. Show your working where appropriate remembering you must show working for questions worth more than 2 marks.

---

#### Question 7

[1 mark]

Circle all of the choices A-E which are true of the following statement.

A function can be identified as one-to-one if, for all values in the domain,

**A**  $\frac{dy}{dx} = 0$  .

**B**  $\frac{dy}{dx} > 0$  .

**C**  $\frac{d^2y}{dx^2} > 0$  .

**D**  $\frac{d^2y}{dx^2} < 0$  .

**E**  $\frac{dy}{dx} < 0$  .

#### Question 8

[1, 2 = 3 mark]

Is the function  $f(x) = (x-1)^3 + x^2$  one-to-one?

Justify your answer.

**Question 9****[1, 1, 3, 3, 2 = 10 marks]**

Given  $f(x) = \frac{x^2 - 2x + 3}{x - 1}$

a) Find the following:

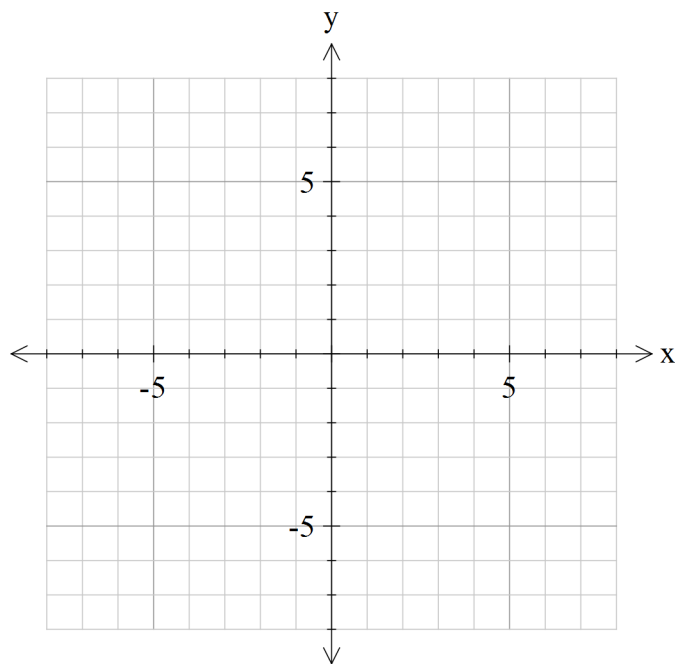
i) Intercepts:

ii) Vertical asymptotes:

iii) Behaviour of  $f(x)$  as  $x \rightarrow \pm \infty$  (including any oblique asymptotes):

iv) Stationary points (accurate to 1 d.p.):

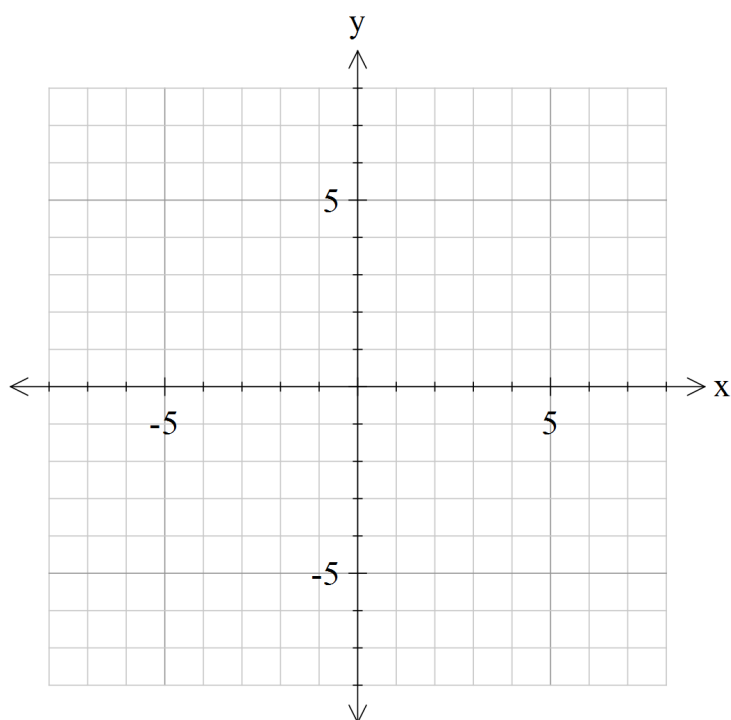
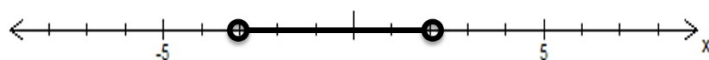
b) Hence, sketch the graph of  $f(x) = \frac{x^2 - 2x + 3}{x - 1}$



### Question 10

[3 marks]

If the number line drawn below represents the solution to the equation  $|x+k|-2 \blacksquare p$ , where  $\blacksquare$  represents an inequality symbol find the values of  $p$  and  $k$  and also determine which symbol  $\blacksquare$  represents.



Question 11

[3 marks]

Given that  $a|x|+b=|2x-3|$  is true for  $0\leq x\leq 1.5$  only, what are the values of  $a$  and  $b$ ?

You may wish to use the grid below.

