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Calculator Free
Linear and Quadratic Functions and Equations

Time: 45 minutes
Total Marks: 45
Your Score: / 45

Question One: [2, 2, 4 = 8 marks]

Consider the following Cartesian points (-2, 5) and (1,11)

(a) Determine the equation of the line passing through these two points.

(b) Determine the equation of a line perpendicular to the line found in part (a) and passing through the point (-6, 4)

(c) The line segment consisting of endpoints (a,b) and (1,11) has a midpoint of (-2, 5).

(i) Determine the values of a and b .

(ii) Hence or otherwise determine the equation of the line parallel to the line in part (b) and passing through the point (a,b)

Question Two: [2, 2, 2, 2, 3, 3, 3, 3, 3 = 23 marks]

Solve each of the following equations, showing all algebraic working.

(a) $\frac{5x}{2} - 3 = -8$

(b) $3(2x - 4)(x + 6) = 0$

(c) $5x - 2 = -3(x + 4)$

(d) $x^2 = 9$

(e) $x^2 - 2x = 24$

(f) $\frac{x-4}{2}=\frac{3x-1}{5}$

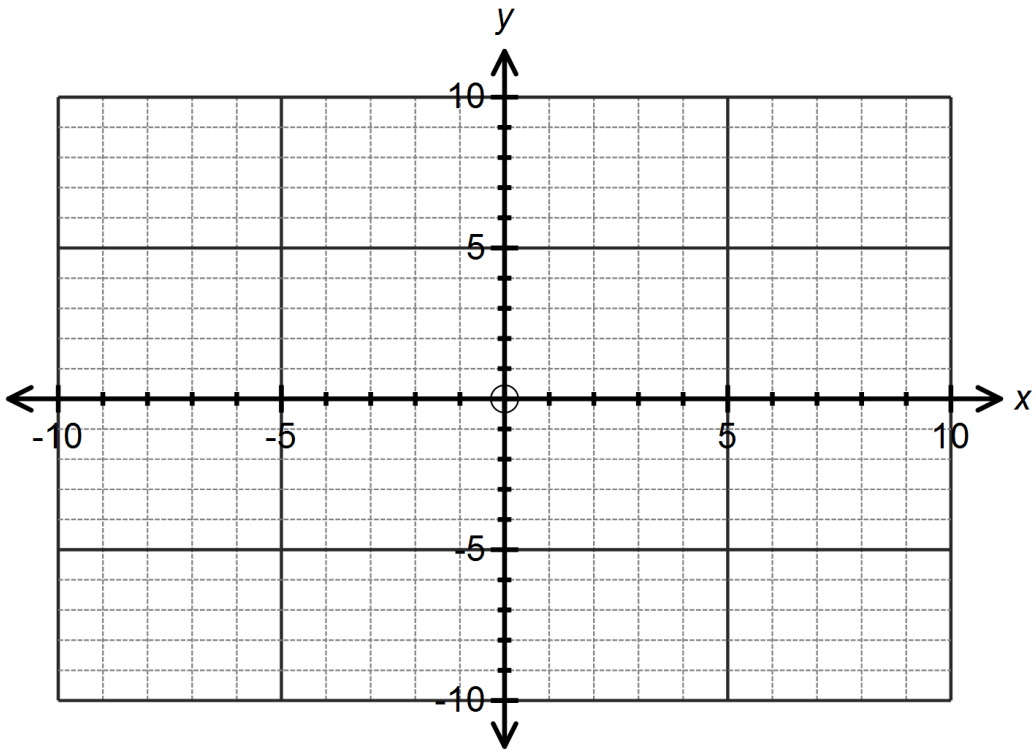
(g) $-2x^2-16x-32=0$

(h) $\frac{2x}{3}-\frac{x+2}{4}=\frac{1}{6}$

(i) $3+x=\frac{10}{x}$

Question Three: [3, 2 = 5 marks]

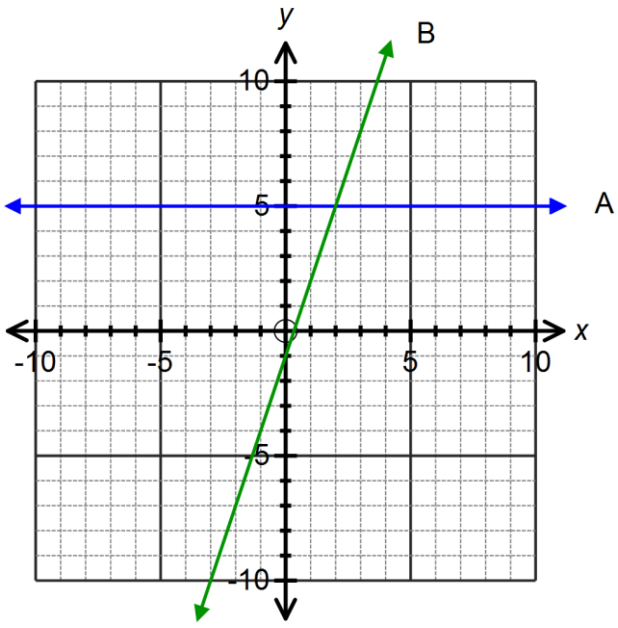
(a) Sketch the lines $x = -2$ and $y = -0.5x + 4$ on the axes below.



(b) Determine the equations of the lines graphed below.

A:

B:



Question Four: [1, 2, 1, 1, 2, 2 = 9 marks]

Consider the quadratic function $y = x^2 - 4x - 5$

(a) State the coordinates of the *y*-intercept.

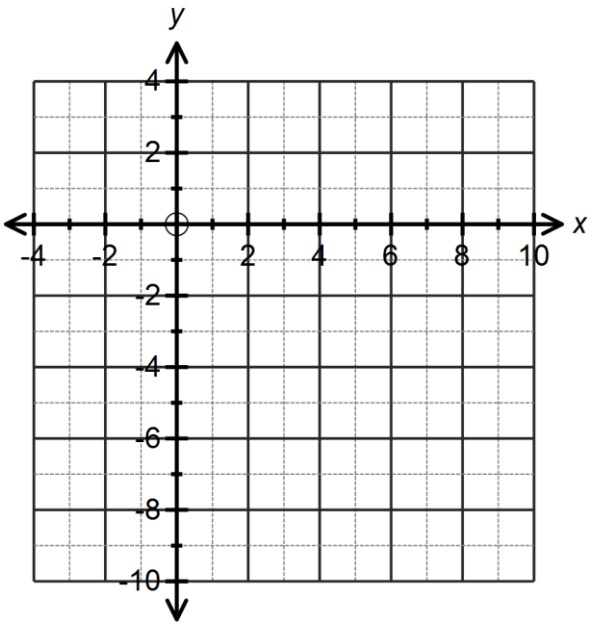
(b) Determine the coordinates of the *x*-intercept(s).

(c) By completing the square, transform the equation of the function into the form $y = a(x+h)^2 + v$

(d) Hence or otherwise determine the equation of the line of symmetry.

(e) State the turning point for this function and its nature.

(f) Sketch this function on the axes provided.



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SOLUTIONS
Calculator Free
Linear and Quadratic Functions and Equations

Time: 45 minutes
Total Marks: 45
Your Score: / 45

Question One: [2, 2, 4 = 8 marks]

Consider the following Cartesian points (-2, 5) and (1,11)

(a) Determine the equation of the line passing through these two points.

$$m = \frac{11-5}{1--2} = 2 \quad \checkmark$$
$$11 = 2(1) + c$$
$$c = 9$$
$$y = 2x + 9 \quad \checkmark$$

(b) Determine the equation of a line perpendicular to the line found in part (a) and passing through the point (-6, 4)

$$m = \frac{-1}{2} \quad \checkmark$$
$$4 = \frac{-1}{2} \times -6 + c$$
$$c = 1$$
$$y = \frac{-1}{2}x + 1 \quad \checkmark$$

(c) The line segment consisting of endpoints (a,b) and (1,11) has a midpoint of (-2, 5).

(i) Determine the values of a and b .

$$\frac{a+1}{2} = -2 \quad a = -5 \quad \checkmark$$
$$\frac{b+11}{2} = 5 \quad b = -1 \quad \checkmark$$

(ii) Hence or otherwise determine the equation of the line parallel to the line in part (b) and passing through the point (a,b)

$$-1 = \frac{-1}{2} \times -5 + c \quad \checkmark$$
$$c = -3.5$$
$$y = \frac{-1}{2}x - 3.5 \quad \checkmark$$

Question Two: [2, 2, 2, 2, 3, 3, 3, 3, 3 = 23 marks]

Solve each of the following equations, showing all algebraic working.

(a) $\frac{5x}{2} - 3 = -8$

$5x = -10$ ✓

$x = -2$ ✓

(b) $3(2x-4)(x+6) = 0$

$2x - 4 = 0$ ✓ $\quad x + 6 = 0$ ✓

$x = 2$ $\quad x = -6$

(c) $5x - 2 = -3(x+4)$

$5x - 2 = -3x - 12$ ✓

$8x = -10$

$x = \frac{-5}{4}$ ✓

(d) $x^2 = 9$

$x = 3,\ x = -3$

✓ ✓

(e) $x^2 - 2x = 24$

$x^2 - 2x - 24 = 0$

$(x-6)(x+4) = 0$ ✓

$x = 6, \quad x = -4$

✓ ✓

(f) $\frac{x-4}{2} = \frac{3x-1}{5}$

✓ ✓

$5x - 20 = 6x - 2$

$-x = 18$

$x = -18$ ✓

(g) $-2x^2 - 16x - 32 = 0$

$-2(x^2 + 8x + 16) = 0$ ✓

$(x+4)(x+4) = 0$ ✓

$x = -4$ ✓

(h) $\frac{2x}{3} - \frac{x+2}{4} = \frac{1}{6}$

$12(\frac{2x}{3}) - 12(\frac{x+2}{4}) = 12(\frac{1}{6})$ ✓

$8x - 3x - 6 = 2$ ✓

$5x = 8$

$x = \frac{8}{5}$ ✓

(i) $3 + x = \frac{10}{x}$

$3x + x^2 = 10$ ✓

$x^2 + 3x - 10 = 0$

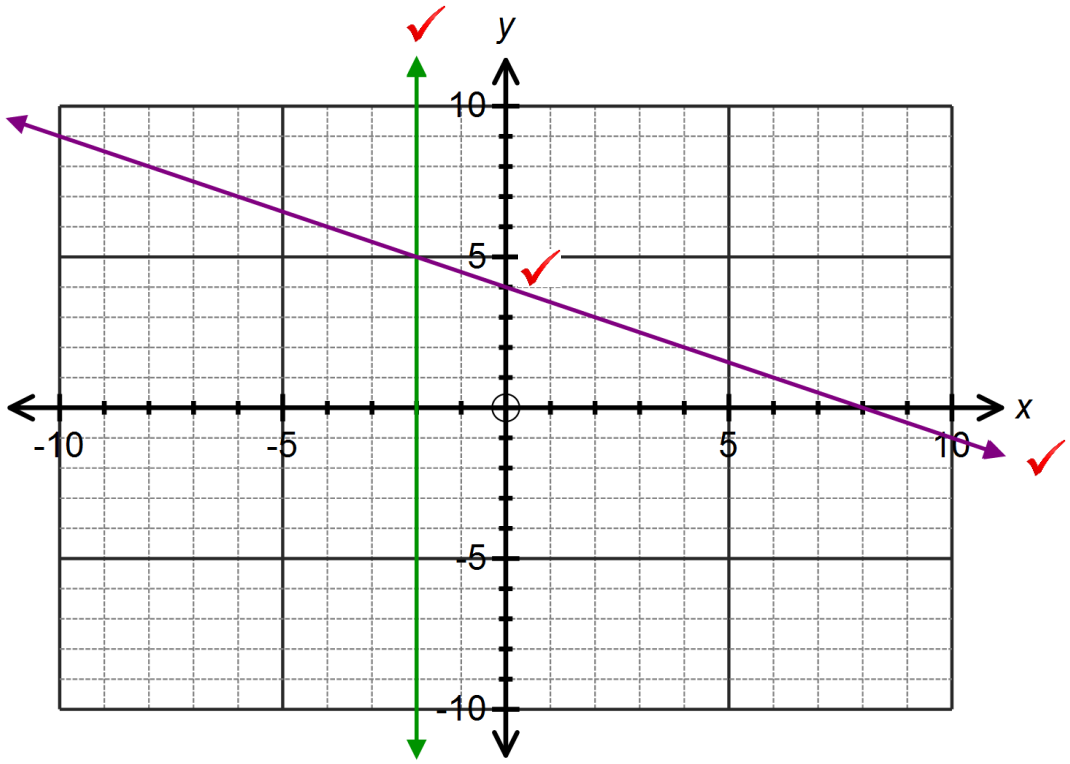
$(x+5)(x-2) = 0$ ✓

$x = -5, \quad x = 2$

✓

Question Three: [3, 2 = 5 marks]

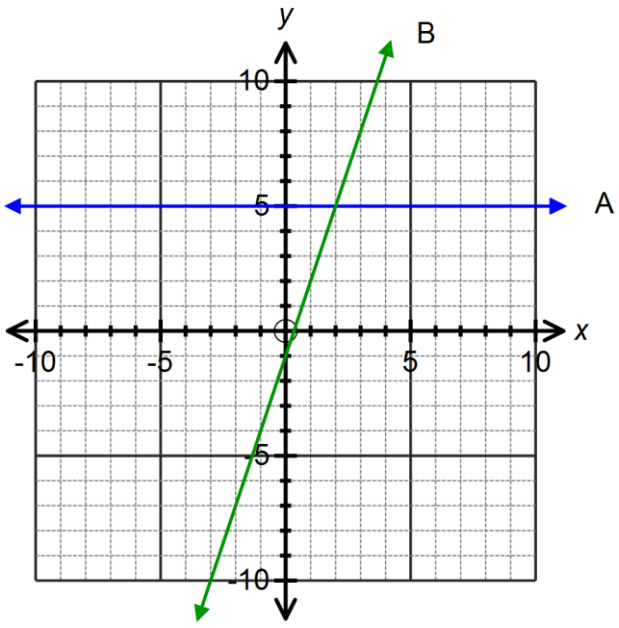
(a) Sketch the lines $x = -2$ and $y = -0.5x + 4$ on the axes below.



(b) Determine the equations of the lines graphed below.

A: $y = 5$

B: $y = 3x - 1$



Question Four: [1, 2, 1, 1, 2, 2 = 9 marks]

Consider the quadratic function $y = x^2 - 4x - 5$

(a) State the coordinates of the *y*-intercept.

$(0, -5)$ ✓

(b) Determine the coordinates of the *x*-intercept(s).

✓
$(x-5)(x+1) = 0$
$x = 5, \quad x = -1$
$(5,0) \quad (-1,0)$ ✓

(c) By completing the square, transform the equation of the function into the form $y = a(x+h)^2 + v$

$y = (x-2)^2 - 2^2 - 5$
$y = (x-2)^2 - 9$ ✓

(d) Hence or otherwise determine the equation of the line of symmetry.

$x = 2$ ✓

(e) State the turning point for this function and its nature.

✓ ✓
$(2, -9)$ minimum

(f) Sketch this function on the axes provided.