Cartesian plane practice

Skill 5.1 Finding the gradient between two points

1 Find the gradient of the line passing between these points using the graph construction method:

(a) $(0, 0)$ and $(4, 5)$ (b) $(1, 2)$ and $(3, 8)$

(c) $(-2, -3)$ and $(2, 4)$ (d) $(3, -4)$ and $(-2, 6)$

2 Find the gradient of the lines passing between these points using the formula method:

(a) $(-3, 2)$ and $(1, -4)$ (b) $(10, 0)$ and $(0, 5)$

(c) $(-3, 0)$ and $(1, -4)$ (d) $(5, 2)$ and $(6, -3)$

Skill 5.2 Finding the distance between two points

1 Find the distance between these points using the graph construction method:

(a) $(0, 0)$ and $(2, 3)$ (b) $(-1, 2)$ and $(3, 5)$

(c) $(-2, -3)$ and $(1, 1)$

2 Find the distance between these points using the formula method:

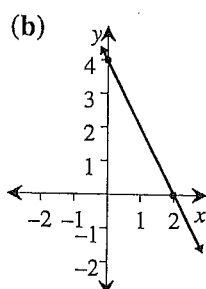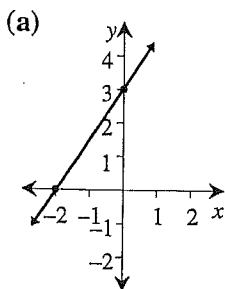(a) $(1, 1)$ and $(4, 2)$ (b) $(5, 6)$ and $(7, 8)$

(c) $(-2, 1)$ and $(3, 5)$

Skill 5.3 Sketching straight lines

Sketch the following straight lines by finding the x-intercept, y-intercept and selecting a checkpoint:

1 $y = x + 4$ 2 $y = 2x - 3$ 3 $x + y = -2$

Skill 5.4 Finding the equation of a straight line

1 Find the equation of these lines:

(a)

(b)

2 Find the equation of the lines passing through the point:

(a) $(-2, 4)$ and $(2, 8)$ (b) $(-1, -3)$ and $(1, 2)$

Skill 5.5 Simultaneous equations

Solve the following equations simultaneously and then show on a graph where they cross.

$$y = 2x + 4 \qquad y = x + 6$$

Skill 5.6 Graphing inequations

Sketch the line $y = x + 1$ and show the regions of the graph which corresponds to:

1 $y > x + 1$ 2 $y \leq x + 1$

Skill 5.7 Plotting quadratic equations

Complete a table of values for the following parabolas and plot the curves on a set of axes.

1 $y = x^2 - 3$ (Use x: $-2, -1, 0, 1, 2$)

2 $y = (x - 3)^2$ (Use x: $1, 2, 3, 4, 5$)

Skill 5.8 Shifting parabolas

For each of the following parabolas show $y = x^2$ as a reference curve and indicate the shift and/or shape change.

1 $y = 2x^2 + 1$ 2 $y = -(x + 5)^2 + 2$

3 $y = 2(x - 3)^2 - 4$

Skill 5.9 Sketching parabolas

Sketch the position of the curve: $y = x^2 - 2x - 8$ by finding the x-intercept, y-intercept and turning point.

Skill 5.10 Plotting cubic equations

Generate a set of points using x-values from -2 to $+2$ for the equation: $y = 2x^3 - 4$. Use these points to plot the curve for the above equation.
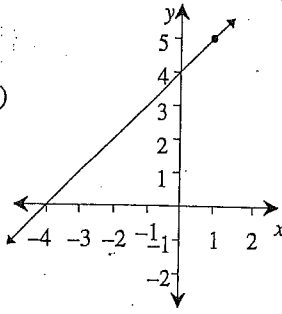
Cartesian plane

Skill 5.1

1 (a) $\frac{5}{4} = 1\frac{1}{4}$ (b) 3 (c) $\frac{7}{4} = 1\frac{3}{4}$

   (d) -2

2 (a) $-\frac{3}{2} = -1\frac{1}{2}$ (b) $-\frac{1}{2}$ (c) -1
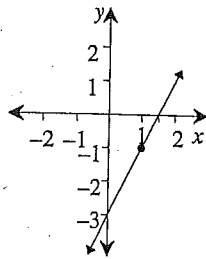
   (d) -5

Skill 5.2

1 (a) 3.61 (b) 5 (c) 5
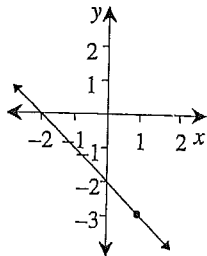2 (a) 3.16 (b) 2.83 (c) 6.40

Skill 5.3

1 x int $= -4$
  y int $= 4$
  check point $(1, 5)$

2 x int $= 1\frac{1}{2}$
  y int $= -3$
  check point $(1, -1)$

3 x int $= -2$
  y int $= -2$
  check point $(1, -3)$

Skill 5.4

1 (a) $y = \dfrac{3x}{2} + 3$ (b) $y = -2x + 4$
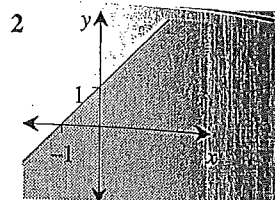
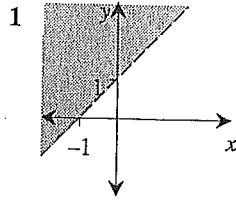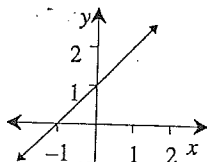2 (a) $y = x + 6$ (b) $y = 2\frac{1}{2}x - \frac{1}{2}$
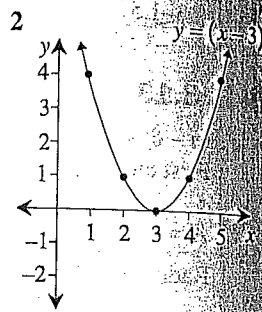
Skill 5.5

$x = 2,\ y = 8$
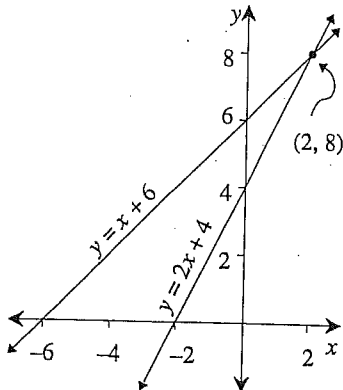
Skill 5.6

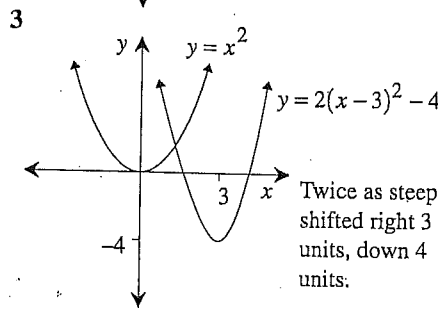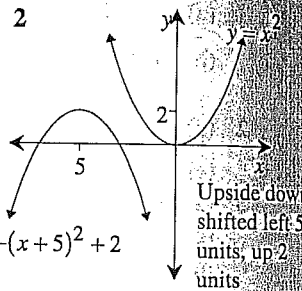$y = x + 1$
x int $= -1$
y int $= 1$

Skill 5.7

1

$y = x^2 - 3$

2

$y = (x-3)^2$

Skill 5.8

1

$y = 2x^2 + 1$
$y = x^2$

Twice as steep shifted up 1 unit

2

$y = x^2$
$y = -(x+5)^2 + 2$

Upside down shifted left 5 units, up 2 units

3

$y = x^2$
$y = 2(x-3)^2 - 4$

Twice as steep shifted right 3 units, down 4 units.
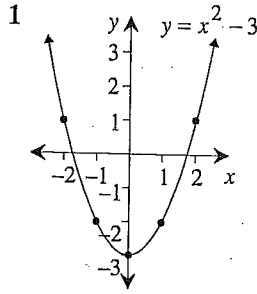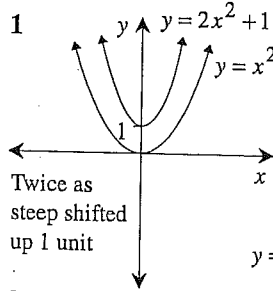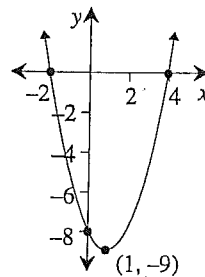
Skill 5.9

$y = x^2 - 2x - 8$
y intercept
  $= -8$
x intercept
  $= (x-4)(x+2) = 0$
  $x = 4,\ y = -2$
turning point
$$x^2 - 2x - 8$$
$$x^2 - 2x + 1 \quad -1 - 8$$
$$(x-1)^2 \qquad -9$$
$$(1,\ -9)$$

sketch

Skill 5.10

$y = 2x^3 - 4$

x	-2	-1	0	1	2
y	-20	-6	-4	-2	12
(x, y)	$(-2, -20)$	$(-1, -6)$	$(0, -4)$	$(1, -2)$	$(2, 12)$