Name: _____

GCSE (1 – 9)

Parallel and Perpendicular Lines

Instructions

- Use **black** ink or ball-point pen.
- Answer all questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need.*
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- You must **show all your working out.**

Information

- The marks for each question are shown in brackets
  – *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end

1 Write down the equation of a line parallel to $y = 3x + 2$

$$\left[y = 3x \pm \text{Anything} \right]$$
$$y = 3x + 1$$

(Total for question 1 is 1 mark)

2 Write down the equation of the line parallel to $y = \frac{1}{2}x + 5$ which passes through (0,2)

$$y = \frac{1}{2}x + 2$$

(Total for question 2 is 2 marks)

3 Write down the equation of the line parallel to $y = -x + 1$ which passes through (0,–4)

$$y = -x - 4$$

(Total for question 3 is 2 marks)

4 Write down the equation of a line perpendicular to $y = 3x + 3$

$$m = -\frac{1}{3}$$

$$\left[y = -\frac{1}{3}x \pm \text{Anything} \right]$$
$$y = -\frac{1}{3}x + 1$$

(Total for question 4 is 1 mark)

5 Write down the equation of the line perpendicular to $y = \frac{1}{2}x - 4$ which passes through (0,7)

$$m = -2$$

$$y = -2x + 7$$

(Total for question 5 is 2 marks)

6 Write down the equation of the line perpendicular to $y = -\frac{3}{2}x - 1$ which passes through (0,–8)

$$m = \frac{2}{3}$$

$$y = \frac{2}{3}x - 8$$

(Total for question 6 is 2 marka)

7 Find the equation of the line parallel to $2y - 3x + 2 = 0$ which passes through (0,4)

$$2y = 3x - 2$$
$$y = \frac{3}{2}x - 1$$
$$M = \frac{3}{2}$$

$$y = \frac{3}{2}x + 4$$

(Total for question 7 is 2 marks)

8 Find the equation of the line parallel to $2x + 5y = 10$ which passes through (0,–3)

$$5y = -2x + 10$$
$$y = \frac{-2}{5}x + 2$$
$$M = \frac{-2}{5}$$

$$y = -\frac{2}{5}x - 3$$

(Total for question 8 is 2 marks)

9 Find the equation of the line perpendicular to $5y = 2x - 4$ which passes through (0,7)

$$y = \frac{2}{5}x - \frac{4}{5}$$

perpendicular $M = -\frac{5}{2}$

$$y = -\frac{5}{2}x + 7$$

(Total for question 9 is 2 marks)

10 Here are the equations of five straight lines.

Line A $y = 2x - 3$
Line B $2y = x + 3$
Line C $4y = 3x - 2$
Line D $2y = 4x - 1$
Line E $3y = 2x - 2$

Two of these lines are parallel.

Write down the two parallel lines.

A: $m = 2$

B: $y = \frac{1}{2}x + \frac{3}{2}$ $m = \frac{1}{2}$

C: $y = \frac{3}{4}x - \frac{1}{2}$ $m = \frac{3}{4}$

D: $y = 2x - \frac{1}{2}$ $m = 2$

Line ......A...... and Line ......D......

(Total for question 10 is 1 mark)

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11 Here are the equations of five straight lines.

Line A $y + 3x = 4$
Line B $2y = x + 1$
Line C $y + 2x = 3$
Line D $y = 4x - 2$
Line E $2y = 2x - 1$

Two of these lines are perpendicular.

Write down the two perpendicular lines.

A: $y = -3x + 4$ $m = -3$

B: $y = \frac{1}{2}x + \frac{1}{2}$ $m = \frac{1}{2}$

C: $y = -2x + 3$ $m = -2$

Line ......B...... and Line ......C......

(Total for question 11 is 1 mark)

12 Line A passes through the points (2, 1) and (5, 10)

Find the equation of the line parallel to A that passes through (2,5)

$$x_1 \ y_1 \quad x_2 \ y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{10 - 1}{5 - 2} = \frac{9}{3} = 3$$

$$y = 3x + c \qquad (2, 5)$$
$$x \quad y$$

$$5 = 3(2) + c$$

$$5 = 6 + c$$

$$c = -1$$

$$\underline{y = 3x - 1}$$

(Total for question 12 is 3 marks)

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13 Line A passes through the points (1, 5) and (5, 7)

Find the equation of the line perpendicular to A that passes through (-1,7)

$$x_1 \ y_1 \quad x_2 \ y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{7 - 5}{5 - 1} = \frac{2}{4} = \frac{1}{2}$$

perp. $m = -2$

$$y = -2x + c \qquad (-1, 7)$$

$$7 = -2(-1) + c$$

$$7 = 2 + c$$

$$c = 5$$

$$\underline{y = -2x + 5}$$

(Total for question 13 is 2 marks)

14 Line A passes through the points (-2, 1) and (4, 10)

Find the equation of the line parallel to A that passes through (2,7)

$$x_1 \; y_1 \quad x_2 \; y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{10 - 1}{4 - -2} = \frac{9}{6} = \frac{3}{2}$$

$$y = \frac{3}{2} x + c \qquad (2, 7)$$

$$7 = \frac{3}{2}(2) + c$$

$$7 = 3 + c$$

$$\underline{c = 4}$$

$$y = \frac{3}{2} x + 4$$

(Total for question 14 is 3 marks)

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15 Line A passes through the points (2, -5) and (10, -1)

Find the equation of the line perpendicular to A that passes through (4,3)

$$x_1 \; y_1 \quad x_2 \; y_2$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{-1 - -5}{10 - 2} = \frac{4}{8} = \frac{1}{2}$$

perp $m = -2$

$$y = -2x + c \qquad (4, 3)$$

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

$$3 = -8 + c$$

$$c = 11$$

$$y = -2x + 11$$

(Total for question 15 is 2 marks)

$$x_1 \ y_1 \ \ x_2 \ y_2$$

16 Line A passes through the points (2, 1) and (5, 10)
Line B passes through the points (4, 7) and (2, 1)
Show that Line A and Line B are parallel.

A: $m = \dfrac{y_2 - y_1}{x_2 - x_1}$

$ = \dfrac{10 - 1}{5 - 2} = \dfrac{9}{3} = 3$

$m = 3$

B: $m = \dfrac{1 - 7}{2 - 4} = \dfrac{-6}{-2} = 3$

$m = 3$

Same gradient ∴ parallel.

(Total for question 16 is 4 marks)

$$x_1 \ y_1 \ \ x_2 \ y_2$$

17 Line A passes through the points (1, 5) and (5, 7)
Line B passes through the points (-1, 7) and (2, 1)
Show that Line A and Line B are perpendicular.

A: $m = \dfrac{7 - 5}{5 - 1} = \dfrac{2}{4} = \dfrac{1}{2}$

B: $m = \dfrac{1 - 7}{2 - {-1}} = \dfrac{-6}{3} = -2$

$\dfrac{1}{2} \times -2 = -1$ ∴ A and B are perpendicular.

(Total for question 17 is 4 marks)

18 Line A passes through the points (3, 6) and (5, -2)
Line B passes through the points (2, 5) and (8, k)

$x_1 \; y_1 \quad x_2 \; y_2$

Line A and Line B are parallel.

Find the value of k.

$$A: \quad m = \frac{-2-6}{5-3} = \frac{-8}{2} = -4$$

B's gradient is -4

$$-4 = \frac{k-5}{8-2}$$

$$-4 = \frac{k-5}{6}$$

$$-24 = k-5$$

$$-19 = k$$

$k = \underline{-19}$

(Total for question 18 is 4 marks)

$x_1 \; y_1 \quad x_2 \; y_2$

19 Line A passes through the points (-3, -1) and (-1, 9)
Line B passes through the points (-2, 1) and (k, 4)

Line A and Line B are perpendicular.

Find the value of k.

$$A: \quad m = \frac{9--1}{-1--3} = \frac{10}{2} = 5$$

perp $m = -\frac{1}{5}$

$$B: \quad -\frac{1}{5} = \frac{4-1}{k--2}$$

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

$$-(k+2) = 15$$

$$-k-2 = 15$$

$$-2 = 15+k$$

$$k = -17$$

$k = \underline{-17}$

(Total for question 19 is 4 marks)