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 $y = 3x + 2$

$y = 3x \pm$ Anything

$y = 3x + 1$

(Total for question 1 is 1 mark)

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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)

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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)

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

$y = -\frac{1}{3}x \pm$ Anything

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

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

(Total for question 4 is 1 mark)

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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)

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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)

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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)

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

E: $y = \frac{2}{3}x - \frac{2}{3}$ $m = \frac{2}{3}$

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: $y = -3x + 4$

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

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

D: $y = 4x - 2$

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

Line B and Line C

(Total for question 11 is 1 mark)

$x_1\ y_1\ \ x_2\ y_2$

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)

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

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

$$= \frac{9}{3}$$

$$= 3$$

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

$5 = 3(2) + c$

$c = -1$

$y = 3x - 1$

(Total for question 12 is 3 marks)

$x_1\ y_1\ \ x_2\ y_2$

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)

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

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

$$= \frac{2}{4}$$

$$= \frac{1}{2}$$

perpendicular $m = -2$

$x\ \ y$

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

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

$7 = 2 + c$

$c = 5$

$y = -2x + 5$

(Total for question 13 is 2 marks)

$x_1\ y_1 \quad x_2\ y_2$

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)

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

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

$$= \frac{9}{6}$$

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

$x \quad y$
$(2, 7)$

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

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

$$7 = 3 + c$$

$$c = 4$$

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

(Total for question 14 is 3 marks)

$x_1\ y_1 \quad x_2\ y_2$

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)

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

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

$$= \frac{4}{8}$$

$$= \frac{1}{2}$$

perpendicular $m = -2$

$x \quad y$
$(4, 3)$

$$y = -2x + c$$

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

$$3 = -8 + c$$

$$c = 11$$

$y = -2x + 11$

(Total for question 15 is 2 marks)

$x_1\ y_1 \quad x_2\ y_2$

16 Line A passes through the points (2, 1) and (5, 10)
Line B passes through the points (3, 10) and (1, 4)
Show that Line A and Line B are parallel.

Line A

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

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

$$= \frac{9}{3}$$

$$= 3$$

Line B

$$m = \frac{4 - 10}{1 - 3}$$

$$= \frac{-6}{-2}$$

$$= 3$$

same gradient ∴ they are 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.

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

Line A

$$m = \frac{7 - 5}{5 - 1}$$

$$= \frac{2}{4}$$

$$= \frac{1}{2}$$

Line B

$$m = \frac{1 - 7}{2 - -1}$$

$$= \frac{-6}{3}$$

$$= -2$$

$\frac{1}{2} \times -2 = -1$ ∴ They are perpendicular

(Total for question 17 is 4 marks)

$x_1\ y_1,\ x_2\ y_2$

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

Line A and Line B are parallel. same gradient

Find the value of k.

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

$$= \frac{-2 - 6}{5 - 3}$$

$$= \frac{-8}{2}$$

$$m = -4$$

Line B

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

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

$$-24 = k - 5$$

$$k = -19$$

$k =$ −19

(Total for question 18 is 4 marks)

$x_1\ y_1,\ x_2\ y_2$

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.

Line A

$$m = \frac{9 - -1}{-1 - -3}$$

$$= \frac{10}{2}$$

$$= 5$$

$\therefore$ perpendicular $m = -\frac{1}{5}$

Line B

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

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

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

$$k + 2 = -15$$

$$k = -17$$

$k =$ −17

(Total for question 19 is 4 marks)