

Marks are indicated in **bold**.

Name: KEY

1. What is the slope of  $3x + 4y - 7 = 0$ ? [1]

$$4y = -3x + 7$$

$$y = -\frac{3}{4}x + \frac{7}{4}$$

$$m = -\frac{3}{4} \quad (1)$$

2. Use algebra to change  $0.\overline{15}$  to a fraction. [2]

LET  $x = 0.\overline{15}$

$$100x = 15.\overline{15} \quad (1)$$

$$100x - x = 15$$

$$99x = 15$$

$$x = \frac{15}{99} = \frac{5}{33} \quad (1)$$

3. If two lines are perpendicular and one of the lines has a slope of  $\frac{1}{3}$ , what is the slope of the other line? [1]

$$m_1 = \frac{1}{3}$$

$$\frac{1}{3}m_2 = -1$$

$$m_2 = -3 \quad (1)$$

$$m_1 m_2 = -1$$

4. Round 15.96211 correct to:

a) 3 significant figures [1]

$$16.0 \quad (1)$$

b) 3 decimal places [1]

$$15.962 \quad (1)$$

c) nearest integer [1]

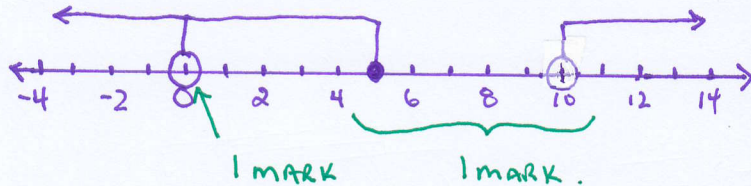
$$16 \quad (1)$$

5. Simplify  $\sqrt{20} + \sqrt{45}$ . [2]

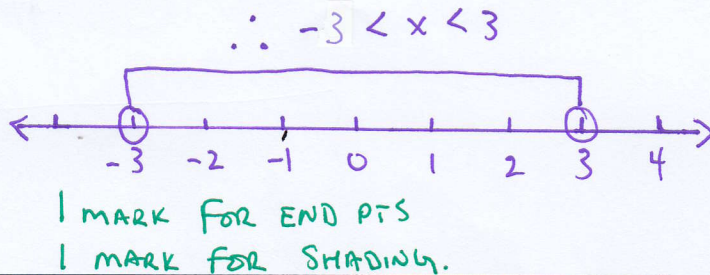
$$= 2\sqrt{5} + 3\sqrt{5} \quad (1)$$

$$= 5\sqrt{5} \quad (1)$$

6. Graph on a number line,  $\{x : x > 10\} \cup \{x : x \leq 5\} \setminus \{0\}$  [2]



8. Graph on a number line  $|x| < 3$  [2]



9. Simplify  $\frac{4a^3bc^5}{8a^2b^2c}$ . [2]

$$= \frac{ac^4}{2b} \quad (1)$$

10. Expand and simplify [2]

$$(3x-5)(2x-6) - x(9x-5)$$

$$= 6x^2 - 18x - 10x + 30 - 9x^2 + 5x \quad (1)$$

$$= -3x^2 - 23x + 30 \quad (1)$$

11. Find D, correct to 3 significant figures if

$$D = \frac{Q}{4\pi r^2}, \quad Q = 600, \quad r = 3 \quad [2]$$

$$= \frac{600}{4\pi(3)^2} \quad (1)$$

$$= \frac{50}{3\pi} \approx 5.31 \quad (1)$$

12. Evaluate  $|3|-|7|$ . [1]

$= -4$  (1)

14. Solve for x when  $|2x+3|=9$ . [2]

$\therefore 2x+3=9$  or  $2x+3=-9$  (1)

$2x=6$                        $2x=-12$

$x=3$                                $x=-6$

$\{3, -6\}$  (1) (BOTH!)

13. Simplify  $\left(\frac{x^2-x-12}{x^2+x-20}\right)\left(\frac{x+5}{x-4}\right)$ . [3]

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

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

15. Simplify  $\frac{m}{m-n} + \frac{n}{n-m}$ . [2]

$= \frac{m-n}{m-n}$  or  $\frac{m}{m-n} - \frac{n}{m-n}$  (1)

$= 1$  (1)

16. Solve  $x^2-10x+23=0$  (solve for the **exact** value of x). [2]

$x = \frac{-(-10) \pm \sqrt{100 - 4(1)(23)}}{2(1)}$  (1)

$x = 5 \pm \sqrt{2}$  (1)

$x = \frac{10 \pm \sqrt{8}}$   
2

17. Solve simultaneously  $a+2b=9$  (1) [2]  
 $4a-3b=-25$  (2)

$-4 \times (1) : -4a - 8b = -36$  ... (3)

(2) + (3) :  $4a - 3b = -25$   
 $-11b = -61$

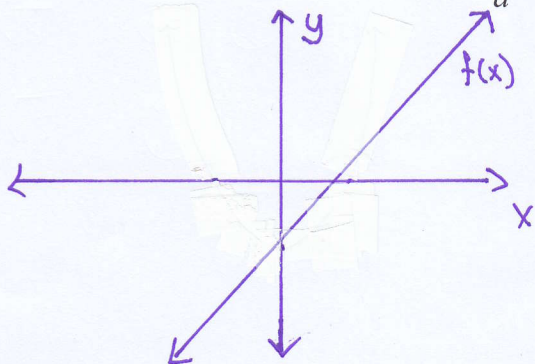
$\therefore b = \frac{61}{11}$  (1)

SUB INTO (1)

$a + 2\left(\frac{61}{11}\right) = 9$

$a = \frac{-23}{11}$  (1)

18. Sketch a possible graph of  $f(x) = a^2x + \frac{b}{a}$ ;  $b \in \mathbb{Z}^+, a < 0$  [2]



1 MARK FOR INCREASING

1 MARK FOR y-INT