

1. Find the exact value of the following: ( **Do not give decimal answers** )

(a)  $\frac{3}{2} \cdot \frac{8}{15} \div 2\frac{6}{7}$

(2 marks)

(b)  $\frac{-5^0(-3)^3 + 48}{5|8 - 23|}$

(2 marks)

2. Simplify. **Give answers with positive exponents.**

(a)  $\left[ \frac{x^4 y^2}{y^4 z^2} \right]^{\frac{1}{2}}$

(2 marks)

(b)  $\frac{(2x^2 y^3)^3 (3x^{-2} y^{-1})}{x^{-3} y^{10}}$

(3 marks)

3. Perform the indicated operations and simplify:

(a)  $3y^2 - 2y + 5 - 3y(4 - y)$

(2 marks)

(b)  $(3x + 2)(x - 1)$

(2 marks)

(c)  $(2x + 1)(x^2 - 5x + 7)$

(2 marks)

(d)  $\frac{x^3 - 2x^2 - 5x + 9}{x + 2}$  (Long Division)

(3 marks)

4. Factor completely:

(a)  $x^2 - 7x + 10$

(2 marks)

(b)  $8x^2 - 4xy + 6xt - 3yt$

(2 marks)

(c)  $3x^2 + 8x - 3$

(2 marks)

(d)  $2x^2 - 5xy + 3y^2$

(2 marks)

(e)  $x^3 - 9x$

(3 marks)

5. Perform the indicated operations and write each answer in lowest terms.

(a)  $\frac{y^2 - 4}{2y^2 + 7y + 6} \cdot \frac{2y + 3}{y^2 - 2y}$  (3 marks)

(b)  $\frac{2w^2 + 6w}{w^2 + 2w - 3} \div \frac{2w(w + 3)}{1 - w}$  (3 marks)

(c)  $\frac{4}{x^2 - x - 2} - \frac{1}{(x - 2)(x - 1)}$  (3 marks)

(d)  $\frac{2}{x - 1} + \frac{1}{x} - \frac{3}{x^2}$  (3 marks)

6. Solve for x:

(a)  $-2(2x - 1) - 8 = 3(x + 2) + 2$  (2 marks)

(b)  $2(3x - 2) - 1 = 6x - 5$  (2 marks)

(c)  $x(x - 10) = -25$  (2 marks)

(d)  $(2x - 1)^2 = 121$  (2 marks)

(e)  $x^2 = x + 1$  (3 marks)

(f)  $4x^2 + 4x + 3 = 0$  (2 marks)

(g)  $\frac{x + 2}{x} = \frac{3x - 2}{2}$  (3 marks)

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

7. Using algebraic techniques and defining variables, solve the following problems.

(a) If three times a certain number decreased by four is equal to two, find the number. (2 marks)

(b) A car has a price of \$8640. For trading in his old car, Tom will get 30% off. Find the price of the car with the trade in.

(2 marks)

(c) A ladder is 17 feet long. It reaches 15 feet up on a wall. How far is the base of the ladder from the wall?

(2 marks)

8. The equation of a line is given by  $5x + 3y = 15$

(a) Find the x-intercept, the y-intercept and the slope.

(b) Use the x and y-intercepts to graph the line.

(4 marks)

9. Give an equation for each of the following lines:

(a) with slope  $\frac{4}{3}$  and passing through the point  $(2, -3)$ .

(2 marks)

(b) passing through the points  $(3, -1)$  and  $(-5, -3)$ .

(2 marks)

10. Given the equations for: 
$$\begin{cases} l_1 : 4x + 3y = -1 \\ l_2 : y = \frac{3}{4}x + 5 \\ l_3 : 3x + 4y = 1 \end{cases} .$$

(a) Which two lines are parallel? Justify.

(b) Which two lines are perpendicular? Justify.

(2 marks)

11. Solve: 
$$\begin{cases} 4x + 3y = 5 \\ 8x + 5y = 11 \end{cases}$$

(3 marks)

12. Simplify. **Do not give decimal answers**

(a)  $2\sqrt{75} - \sqrt{48}$

(2 marks)

(b)  $(\sqrt{3} - 2)(\sqrt{3} + 2)$

(1 mark)

(c)  $(\sqrt{5} + \sqrt{2})(2\sqrt{5} - 3\sqrt{2})$

(2 marks)

(d)  $\sqrt{25x^5y^8}$  where  $x \geq 0$  and  $y \geq 0$

(2 marks)

13. Rationalize the denominator and simplify your answer.

$$\frac{4}{3 + \sqrt{7}}$$

(2 marks)

14. Rationalize the numerator and simplify your answer.

$$\frac{\sqrt{x} - 2}{x - 4}$$

(2 marks)

15. Use your calculator with 4 decimal places to find the following:

$$(a) \sin 65^\circ = \underline{\hspace{2cm}} \quad (b) \csc 21^\circ = \underline{\hspace{2cm}}$$

$$(c) \tan \frac{5\pi}{4} = \underline{\hspace{2cm}} \quad (d) \sec \pi = \underline{\hspace{2cm}}$$

(2 marks)

16.  $\triangle ABC$  has  $\angle C = 90^\circ$  with side  $c = 17$  and side  $a = 15$ . Find side  $b$  and  $\angle A$

(2 marks)

17.  $\triangle ABC$  has  $\angle C = 90^\circ$  with side  $c = 12$  and  $\angle A = 44^\circ$ . Find side  $a$ .

(2 marks)

18.  $\triangle ABC$  has  $\angle A = 77^\circ$ ,  $\angle B = 38^\circ$  and side  $c = 15$ . Find side  $a$ .

$$\text{Use Law of Sines: } \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

(2 marks)

19.  $\triangle ABC$  has  $\angle A = 120^\circ$ , side  $b = 2$  and side  $c = 5$ . Find side  $a$ .

$$\text{Use Law of Cosines: } a^2 = b^2 + c^2 - 2bc \cos A$$

(2 marks)

### Answers

1 (a)  $\frac{7}{25}$  (b) 1

2 (a)  $\frac{x^2}{yz}$  (b)  $\frac{24x^7}{y^2}$

3 (a)  $6y^2 - 14y + 5$  (b)  $3x^2 - x - 2$  (c)  $2x^3 - 9x^2 + 9x + 7$  (d)  $x^2 - 4x + 3 + \frac{3}{x+2}$

4 (a)  $(x-5)(x-2)$  (b)  $(2x-y)(4x+3t)$  (c)  $(3x-1)(x+3)$  (d)  $(2x-3y)(x-y)$   
(e)  $x(x+3)(x-3)$

5 (a)  $\frac{1}{y}$  (b)  $\frac{-1}{w+3}$  (c)  $\frac{3x-5}{(x-2)(x+1)(x-1)}$  (d)  $\frac{3x^2-4x+3}{x^2(x-1)}$

6 (a)  $x = -2$  (b) many solutions (c)  $x = 5$  (d)  $x = -5, 6$  (e)  $\frac{1 \pm \sqrt{5}}{2}$  (f) no real solution  
(g)  $x = \frac{-2}{3}, 2$  (h)  $x = 1$

7 (a)  $x = 2$  (b) \$6048 (c) 8

8 (a)  $x - int = 3$  ,  $y - int = 5$

9 (a)  $y = \frac{4}{3}x - \frac{17}{3}$  (b)  $x - 4y - 7 = 0$

10 (a)  $l_1 \parallel l_3$  (b)  $l_1 \perp l_2$  or  $l_3 \perp l_2$

11 (2, -1)

12 (a)  $6\sqrt{3}$  (b) -1 (c)  $4 - \sqrt{10}$  (d)  $5x^2\sqrt{xy^4}$

13  $2(3 - \sqrt{7})$

14  $\frac{1}{\sqrt{x} + 2}$

15 (a) .9063 (b) 2.7904 (c) 1 (d) -1

16  $b = 8$ ,  $\angle A = 61.92^\circ$

17  $a = 8.3359$

18  $a = 16.1264$

19  $a = 6.2449$