

Answer

Review Worksheet 1

Shape(2D&3D), Scientific notation and Significant figures.

1. Write in scientific notation

(1) 124,500,000,000

$$1.245 \times 10^{11}$$

(2) 0.00000536

$$5.36 \times 10^{-6}$$

2. Round the following to 3 S.F.

(a) 0.00027438

$$2.74 \times 10^{-4} / 0.000274$$

(b) 30259812

$$30300000 / 3.03 \times 10^7$$

3. Convert to square metres(m²) and round to 2 S.F. in scientific notation.

(a) 34512 km²

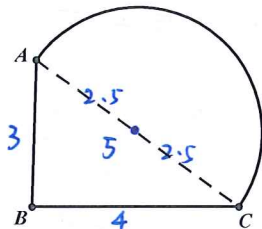
$$3.5 \times 10^{10} \text{ m}^2$$

(b) 1.23 cm²

$$1.2 \times 10^{-4} \text{ m}^2$$

4. Find the area and the perimeter of the shape below

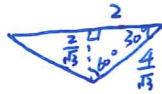
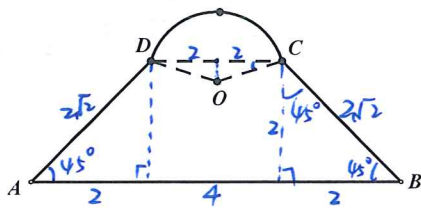
(a) AB=3 BC=4 $\angle ABC=90^\circ$



$$\text{perimeter} = 3 + 4 + \frac{2\pi \times 2.5}{2} = 7 + \frac{5}{2}\pi$$

$$S = \frac{1}{2} \times 3 \times 4 + \frac{1}{2} \times \pi \times (2.5)^2 = 6 + \frac{25}{8}\pi$$

(b) AB=8, CD=4, $\angle DAB = \angle CBA = 45^\circ$, AB//CD, Sector OCD, $\angle DOC = 120^\circ$.



$$r = \frac{4}{\sqrt{3}} = \frac{4}{3}\sqrt{3}$$

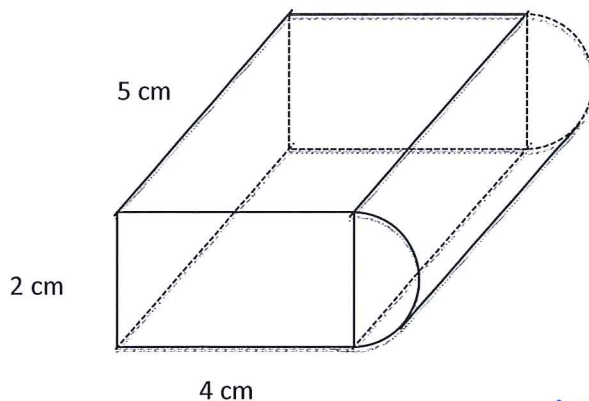
$$\begin{aligned} \text{perimeter} &= 4\sqrt{2} + 8 + \frac{120}{360} \times 2\pi r \\ &= 4\sqrt{2} + 8 + \frac{8}{9}\sqrt{3}\pi \end{aligned}$$

$$S = S_{ABCD} + S_{\text{sector} OCD} - S_{\Delta OCD}$$

$$= \frac{1}{2}(4+8) \times 2 + \frac{120}{360} \times \pi r^2 - \frac{1}{2} \times 4 \times \frac{2}{\sqrt{3}}$$

$$= 12 - \frac{4\sqrt{3}}{3} + \frac{16}{9}\pi$$

5. Find the surface area and the volume of the shape below



$$\begin{aligned} \text{Total Surface Area} &= (2 \times 4) \times 2 + (5 \times 4) \times 2 + 5 \times 2 + \left(\frac{1}{2} \times \pi \times 1^2\right) \times 2 + \frac{1}{2} \times 2\pi \times 1 \times 5 \\ &= 66 + 6\pi \text{ cm}^2 \end{aligned}$$

$$V = 5 \times 2 \times 4 + \frac{1}{2} \times \pi \times 1^2 \times 5 = 40 + \frac{5}{2}\pi$$

Review Worksheet 2

1. Conversion from decimals to fraction
2. Simplification, Four Operation, Rationalization of Surds
3. Complex number

1. Convert the decimals to fractions

- (1) 0.352 (2) 2.456
 (3) 0.4 $\dot{5}$ (4) 0.1 $\dot{2}3$

1. (1) $\frac{352}{1000} = \frac{44}{125}$ (2) $\frac{2456}{1000} = \frac{307}{125}$

(3) $x = 0.4\dot{5}$ (4) $x = 0.1\dot{2}3$
 $100x = 45.4\dot{5}$ $1000x = 123.1\dot{2}3$
 $99x = 45$ $999x = 123$
 $x = \frac{45}{99} = \frac{5}{11}$ $x = \frac{123}{999} = \frac{41}{333}$

2. Simplify

- a) $5\sqrt{24} - 3\sqrt{8} + 2\sqrt{54} - 4\sqrt{18}$
 b) $3\sqrt{108} + 2\sqrt{75} - 4\sqrt{27} + 2\sqrt{45}$

2. a) $16\sqrt{6} - 18\sqrt{2}$
 b) $16\sqrt{3} + 6\sqrt{5}$

3. Simplify

- a) $\frac{3}{2\sqrt{2}-\sqrt{3}} - \frac{5}{2\sqrt{2}+\sqrt{3}}$ b) $\frac{2\sqrt{3}-\sqrt{2}}{4\sqrt{2}-3\sqrt{3}}$

3. a) $\frac{3(2\sqrt{2}+\sqrt{3}) - 5(2\sqrt{2}-\sqrt{3})}{(2\sqrt{2})^2 - (\sqrt{3})^2}$

*4 Simplify

a) $\frac{2}{\sqrt{2}+\sqrt{3}-\sqrt{5}} = \frac{3\sqrt{2} + 2\sqrt{3} + \sqrt{30}}{6}$

$= \frac{8\sqrt{3} - 4\sqrt{2}}{5}$

b) $\frac{(2\sqrt{3}-\sqrt{2})(4\sqrt{2}+3\sqrt{3})}{(4\sqrt{2})^2 - (3\sqrt{3})^2}$

5. Find the value of $i^{2016} + i^{314}$

$= 1 - 1 = 0$

$= \frac{5\sqrt{6} + 10}{5} = 2 + \sqrt{6}$

6. Simplify

$\frac{3i+5}{2-4i} = \frac{(3i+5)(2+4i)}{(2-4i)(2+4i)} = \frac{13i-1}{10}$

Answer

Review Worksheet 3

1. Line equation (gradient-point, 2 points, parallel, perpendicular)
2. Midpoint, *Perpendicular Bisector, distance of two points
3. Simultaneous Equations
4. Linear Inequality
- *5. Optimization

1. A line passes through the points $A(1, -4)$ and $B(-2, 3)$.
 - a) Find the equation of this line. $y = -\frac{7}{3}x - \frac{5}{3}$ $\swarrow -7x + 3y + 5 = 0$
 - b) Find the midpoint of line segment AB. $(-\frac{1}{2}, -\frac{1}{2})$
 - c) Find the distance between A and B. $\sqrt{58}$
 - *d) Find the perpendicular bisector of line segment AB. $y = \frac{3}{7}x - \frac{2}{7}$

2. Find the equation of the lines through point $(2, -3)$
 - a) That is parallel to the line $y = 4x - 1$ $y = 4x - 11$
 - b) That is perpendicular to the line $y = 4x - 1$ $y = -\frac{1}{4}x - \frac{5}{2}$

3. Solve the simultaneous equations by either **substitution** or **elimination**.

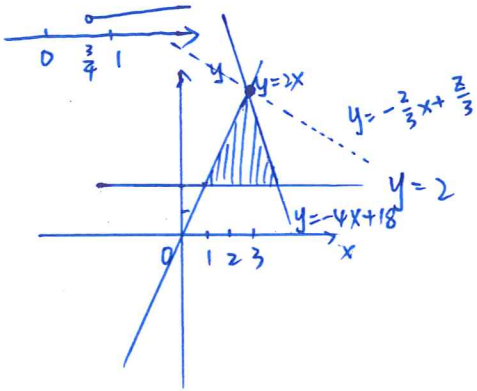
$$\begin{cases} 7x - 2y = -3 \\ 2x + 5y = 1 \end{cases} \Rightarrow \begin{cases} x = -\frac{1}{3} \\ y = \frac{1}{3} \end{cases}$$

4. Solve $-3x + 1 < x - 2 < 4x + 1$ and draw the answer on a number line.

$$x > \frac{3}{4}$$

5. Draw and indicate the feasible region:

$$\begin{aligned} y &\leq 2x \\ y &\leq -4x + 18 \\ y &\geq 2 \end{aligned}$$



*Find the maximum value of $2x + 3y$

$$Z = 2x + 3y$$

$$\rightarrow y = -\frac{2}{3}x + \frac{Z}{3}$$

when $x = 3, y = 6$

$$Z_{\max} = 2x + 3y = 24$$

Answer

Review Worksheet 4

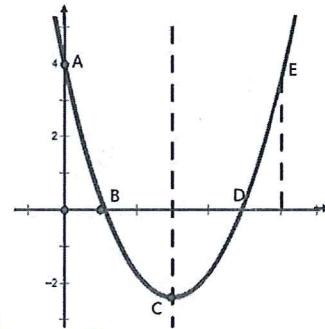
Quadratics and Higher Degree Polynomial Functions, Equations, Patterns and Models

- Identify and represent quadratic functions by table, formula and graph and convert from one form of representation to another.
- Select and use technology in various combinations to assist in mathematical inquiry, to manipulate and represent data, to analyze functions and carry out symbolic manipulation.
- Recognize and explain the roles of the relevant constants in the relationships $y = a(x - p)^2 + q$ and $y = ax^2 + bx + c$.

1. The quadratic function $f(x)$ is sketched like the graph.

a) Fill in the table

| Point | x | y |
|-------|---|-----------------|
| A | 0 | 4 |
| B | 1 | 0 |
| C | 3 | $-\frac{16}{5}$ |
| D | 5 | 0 |
| E | 6 | 4 |



b) What is the equation of this parabola $f(x) = y = ax^2 + bx + c$

c) Which line is the line of symmetry? $x = 3$ $y = \frac{4}{5}x^2 - \frac{24}{5}x + 4$

d) Vertex $(3, -\frac{16}{5})$, x-intercepts $(1, 0)$ $(5, 0)$, y-intercept $(0, 4)$

e) $f(2.5) = -3$

f) When $y = 9.6$, what are the possible values of x ?

$$\frac{4}{5}x^2 - \frac{24}{5}x + 4 = 9.6$$

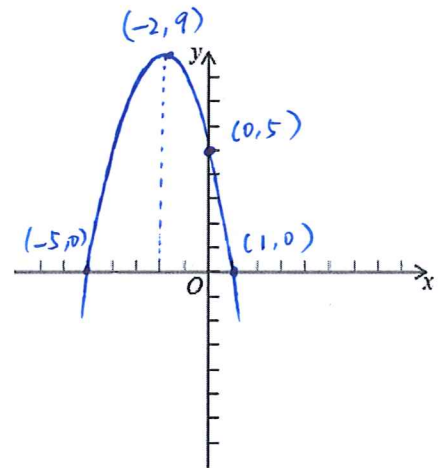
$$x = -1 \text{ or } x = 7$$

2. $f(x) = -x^2 - 4x + 5$

a) Convert it to vertex form $y = a(x - h)^2 + k$

b) Sketch $f(x)$, label the vertex and y-intercept, x-intercept

a) $y = -(x + 2)^2 + 9$



- Factorise quadratic expressions and equations.

1. $f(x) = x^2 + 6x = (x + 3)^2 - 9$

2. $f(x) = 3x^2 - 9x = 3(x - \frac{3}{2})^2 - \frac{27}{4}$

3. $f(x) = -2x^2 + 5x + 1 = -2(x - \frac{5}{4})^2 + \frac{33}{8}$

- Solve quadratic equations using factorizing, completing the square, the quadratic

formula and graphical methods, with and without technology.

1. Using factorizing

a) $x^2 - 4x = 12$

$$\begin{aligned}x^2 - 4x - 12 &= 0 \\(x-6)(x+2) &= 0 \\x &= -2 \text{ or } x = 6\end{aligned}$$

c) $x^2 + 7x = 0$

$$x(x+7) = 0 \quad x = 0 \text{ or } x = -7$$

b) $2x^2 + 6x - 8 = 0$

$$\begin{aligned}x^2 + 3x - 4 &= 0 \\(x+4)(x-1) &= 0 \\x &= -3 \text{ or } x = 1\end{aligned}$$

2. Using completing square

a) $x^2 + 6x = 4$

$$\begin{aligned}(x+3)^2 &= 13 \\x &= \pm\sqrt{13} - 3\end{aligned}$$

b) $-2x^2 + 4x + 5 = 0$

$$\begin{aligned}x^2 - 2x &= \frac{5}{2} \\(x-1)^2 &= \frac{7}{2} \\x &= \pm\sqrt{\frac{7}{2}} + 1\end{aligned}$$

3. Using formula

a) $5x^2 - 8x + 3 = 0$

$$a = 5 \quad b = -8 \quad c = 3$$

$$\begin{aligned}x &= \frac{8 \pm \sqrt{64 - 4 \times 5 \times 3}}{2 \times 5} \\&= \frac{8 \pm 2}{10}\end{aligned}$$

$$x = 1 \text{ or } x = \frac{3}{5}$$

* extended – Vieta's formula

a and b are the two roots of $x^2 - 3x - 4 = 0$

what is the value of $a-b$? (without solving equation)

$$a+b = 3$$

$$ab = -4$$

$$\begin{aligned}(a-b)^2 &= (a+b)^2 - 4ab \\&= 9 + 16 \\&= 25\end{aligned}$$

$$a-b = \pm 5$$