PRACTICE QUESTIONS

Equations Solve the following equations:

a) $(2x + 5)(x - 1) = 0$,

b) $(x + 3)(x - 2)(3x - 7) = 0$,

c) $(5 - x)(x - 2) = 0$,

d) $(x^2 - 1)(x - 3) = 0$,

e) $(x^2 - 9)(x^2 + 4) = 0$,

f) $(2x^2 - 8)(x - 1)(x^2 - 20) = 0$.

Equations ctd. Solve the following equations, remember about the domain:

a) $\dfrac{(2x + 5)(x - 1)}{x^2 + 1} = 0$,

b) $\dfrac{(x^2 - 9)(x^2 + 4)}{x + 3} = 0$,

c) $\dfrac{(2x^2 - 8)(x - 1)}{(x^2 - 1)(x + 2)} = 0$.

Sets

For each of the following numbers decide if they belong to the sets:
(a) $\mathbb{Z} - \mathbb{N}$; (b) $\mathbb{R} - \mathbb{Q}$:

$$(-2)^2, (-2)^3, -2^2, -2^3, \sqrt{2}^2, (-\sqrt{2})^2, (-\sqrt{2})^3, \frac{\sqrt{2}}{2}, \left(\frac{\sqrt{2}}{2}\right)^2$$

Sets ctd.

Given sets $A = (-1, 3)$, $B = \langle 0, 4)$ and $C = \langle 4, 5 \rangle$. Mark on the number line the sets:
(a) $B \cup C$ (b) $A \cap B$ (c) $(A \cup C) - B$ (d) $(A - C) \cap B$ (e) $(A \cap C') - B$

Logic

Write the converse of each of the following statements and show that the converse is false:

- If x is a factor of a prime number greater than 2, then x is odd.

- If x is divisible by 10, then x is divisible by 5.

- If $x > 100$, then $x^2 > 100000$.

Logic ctd.

Write the negation of each of the following statements and show that the negation is true:

- All prime numbers are odd.

- All natural numbers are positive.

- The square of every number is greater than that number.

Inequalities

Solve the following inequalities:

a) $(2x + 5)(x - 1) > 0$,

b) $(x + 3)(x - 2)(3x - 7) < 0$,

c) $(5 - x)(x - 2) \geqslant 0$,

d) $(x^2 - 1)(x - 3) \leqslant 0$,

e) $(x^2 - 9)(x^2 + 4) > 0$,

f) $(2x^2 - 8)(x - 1)(x^2 - 20) \leqslant 0$.

Inequalities ctd. Solve the following inequalities, remember about the domain:

a) $\dfrac{(2x + 5)(x - 1)}{x^2 + 1} > 0$,

b) $\dfrac{(x^2 - 9)(x^2 + 4)}{x + 3} \leqslant 0$,

c) $\dfrac{(2x^2 - 8)(x - 1)}{(x^2 - 1)(x + 2)} \geqslant 0$.

Venn diagrams

Draw diagrams to illustrate the following scenarios.

a) 10 people, 8 like tea, 7 like coffee, 6 like both.

b) 20 people, 10 have dogs, 10 have cats, 9 have birds. 3 have dogs and cats, 3 have dogs and birds, 5 have cats and birds. 1 has all three types of pets.

c) 40 people. 14 play tennis, 14 play squash, 14 play badminton. 4 play badminton and squash, 3 play badminton and tennis, 2 play tennis and squash. 1 plays all three.