UNIT 17 Using Graphs  Mental Tests

Mental Test 17.1

1. How does the transformation $y = f(x + 2)$ move the graph of $y = f(x)$? (horizontally, 2 units to the left)

2. If $y = f(x)$ is defined on the interval $[0, 1]$, on what interval is $y = f(2x)$ defined? $\left[0, \frac{1}{2}\right]$?

3. How does the transformation $y = f(x) + 1$ move the graph of $y = f(x)$? (vertically, 1 unit up)

4. (a) On a grid, sketch the graph of $y = f(x)$ when $f(x) = x^2$.
   (b) On the same grid, sketch the graphs of:
   (i) $y = f(2x)$  
   (ii) $y = f\left(\frac{x}{2}\right)$  
   (iii) $y = f\left(\frac{1}{x}\right)$. (see below)

5. What does the area under a speed-time graph represent? (distance)

6. On a distance-time graph, what does the gradient represent? (speed)

7. Sketch a speed-time graph for a high speed train running non-stop between two stations. (see below)

8. If $x$ and $y$ are related by $y = ax^2 + b$, plotting which two variables will give a straight line? (y and $x^2$)

\[ y = f\left(\frac{1}{x}\right) \]

\[ y = f\left(\frac{x}{2}\right) \]

\[ y = f(2x) \]

\[ y = f(x) \]

\[ \text{Speed} \]

\[ \text{Time} \]
Mental Test 17.2

1. How does the transformation \( y = f(x - 2) \) move the graph of \( y = f(x) \)?
   (horizontally, 2 units to the right)

2. If \( y = f(x) \) is defined on the interval \([0, 1]\), on what interval is \( y = f\left(\frac{x}{2}\right) \) defined?
   \([0, 2]\)

3. How does the transformation \( y = f(x) - 1 \) move the graph of \( y = f(x) \)?
   (vertically, 1 unit down)

4. (a) On a grid, sketch the graph of \( y = f(x) \) when \( f(x) = x \).
    (b) On the same grid, sketch the graphs of:
        (i) \( y = f(2x) \)
        (ii) \( y = f\left(\frac{x}{2}\right) \)
        (iii) \( y = f\left(\frac{1}{x}\right) \).

5. What does the area under an acceleration-time graph represent?
   (speed)

6. On a speed-time graph, what does the gradient represent?
   (acceleration)

7. Sketch a distance-time graph for a high speed train running non-stop between two stations.
   (see below)

8. If \( x \) and \( y \) are related by \( y = a \sqrt{x} + b \), plotting which two variables will give a straight line?
   (see below)
   (\( y \) and \( \sqrt{x} \))