1.
B is directly proportional to A.
When $A = 6$, $B = 72$.

(a) Find an equation for $B$ in terms of $A$.

(b) Find the value of $B$ when $A = 4.5$.

2.
D is directly proportional to C.
When $C = 5$, $D = 90$.

(a) Find an equation for $D$ in terms of $C$.

(b) Find the value of $D$ when $C = 7$.

(c) Find the value of $C$ when $D = 126$. 
3.
F is directly proportional to $E^2$.
When $E = 3$, $F = 108$.

(a) Find an equation for $F$ in terms of $E$.

(b) Find the value of $F$ when $E = 2$.

(c) Find the value of $E$ when $F = 1200$.

4.
G is directly proportional to $\sqrt{H}$.
When $H = 400$, $G = 60$.

(a) Find an equation for $G$ in terms of $H$.

(b) Find the value of $G$ when $H = 64$.

(c) Find the value of $H$ when $G = 75$. 
5. 
Q is inversely proportional to P.
When P = 0.5, Q = 16.

(a) Find an equation for Q in terms of P.

(b) Find the value of Q when P = 4.

(c) Find the value of P when Q = 1.6.

6. 
M is inversely proportional to N.
When N = 6, M = 11.

(a) Find an equation for M in terms of N.

(b) Find the value of N when M = 132.

(c) Find the value of M when N = 22.
7.
O is inversely proportional to $P^3$.
When $P = 3$, $O = 2$.

(a) Find an equation for $O$ in terms of $P$.

(b) Find the value of $O$ when $P = 2$.

(c) Find the value of $P$ when $O = 432$.

8.
T is inversely proportional to $\sqrt{U}$.
When $U = 16$, $T = 20$.

(a) Find an equation for $T$ in terms of $U$.

(b) Find the value of $U$ when $T = 160$.

(c) Find the value of $T$ when $U = 64$. 
9. 
W is directly proportional to \( V^2 \).
When \( V = 5 \), \( W = 400 \).

(a) Find an equation for \( W \) in terms of \( V \).

(b) Find the value of \( W \) when \( V = 1.5 \).

(c) Find the value of \( V \) when \( W = 6 \). Give your answer to 1 decimal place.

10. 
Y is inversely proportional to \( \sqrt[3]{X} \).
When \( X = 125 \), \( Y = 22 \).

(a) Find an equation for \( Y \) in terms of \( X \).

(b) Find the value of \( Y \) when \( X = 1,000 \).

(c) Find the value of \( X \) when \( Y = 13 \). Give your answer to 3 significant figures.
11.
\( e \propto r^2. \)
Complete the table.

<table>
<thead>
<tr>
<th>e</th>
<th>750</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>r</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

12.
\( L \propto \frac{1}{M}. \)
Complete the table.

<table>
<thead>
<tr>
<th>L</th>
<th>0.5</th>
<th>0.15</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>0.25</td>
<td>20</td>
</tr>
</tbody>
</table>
13.
\[ P \propto \frac{1}{t^2}. \]
Complete the table.

<table>
<thead>
<tr>
<th>P</th>
<th>0.8</th>
<th>20</th>
</tr>
</thead>
<tbody>
<tr>
<td>t</td>
<td>4</td>
<td>0.1</td>
</tr>
</tbody>
</table>
16. The speed that a long distance runner runs at is inversely proportional to the time they have been running for. After running for 2 hours, the runner is running at 3 metres per second. Work out the speed at which the runner is running after 150 minutes.

17. The distance, D (in kilometres), travelled by a space shuttle is directly proportional to the square of the amount of fuel carried, F (in gallons). On Mission 1, the shuttle carried 500 gallons of fuel and travelled $6.5 \times 10^5$ kilometres. On Mission 2, the shuttle travelled $8.8 \times 10^6$ kilometres. Find the number of gallons of fuel carried by the shuttle on Mission 2, to the nearest gallon.