There are **7 questions** in this test. Give yourself **10 minutes** to answer them all.
You may use a calculator for this test.

1. Which of these expressions does **not** simplify to p. Circle your answer.

$$5p - 4p \qquad p - p + q + p - q \qquad pq + 2p - p - pq \qquad p \div p + p - p$$

[1]

2. Circle the formula that means 'r is three more than t'.

$$r = t - 3 \qquad r = t + 3 \qquad r = 3t \qquad r = \frac{t}{3}$$

[1]

3. Expand $7(x + 2)$.

....

[1]

4. $u = \dfrac{v + w}{3w}$

Find the value of u when $v = \frac{1}{2}$ and $w = 1$, giving your answer as a simplified fraction.

$u =$ ....
[1]

5. Prove that the sum of five consecutive whole numbers is always divisible by 5.
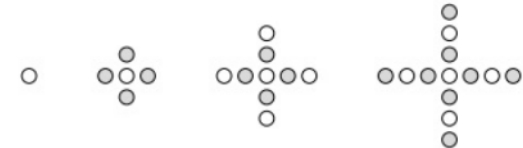
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....

....

....

[2]

6. Solve the quadratic equation $x^2 - 7x + 12 = 0$.

$x =$ ....

$x =$ ....
[3]

7. A shape sequence is made up of white and grey circles.
The first four patterns in the sequence are shown below.

Determine if any pattern in the sequence has exactly 113 white circles. Show all your working.

....

....

....

....

[3]

/ 12

5. Let n be a whole number.
Then $n + 1$ is the next whole number,
$n + 2$ is the next whole number after
that, and so on.
$n + (n + 1) + (n + 2)$
$+ (n + 3) + (n + 4)$ *[1 mark]*
$= 5n + 10 = 5(n + 2)$
Since the sum is $5 \times$ a whole number,
it is divisible by 5. *[1 mark]*

6. $x^2 - 7x + 12 = (x - 3)(x - 4)$
*[1 mark for 3 and 4, 1 mark for
the correct signs]*
$(x - 3)(x - 4) = 0$
$\Rightarrow x = 3, \; x = 4$ *[1 mark]*

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1. $p \div p + p - p$ *[1 mark]*
This simplifies to 1.

2. $r = t + 3$ *[1 mark]*

3. $7(x + 2) = (7 \times x) + (7 \times 2)$
$= 7x + 14$ *[1 mark]*

4. $u = \dfrac{\frac{1}{2} + 1}{3 \times 1} = \dfrac{\frac{3}{2}}{3} = \dfrac{3}{6} = \dfrac{1}{2}$ *[1 mark]*

7. White circles: 1, 1, 5, 5, 9, 9, ...
Ignoring repeats: 1, 5, 9, ... *[1 mark]*
The difference is 4 so the nth term
rule will contain a $4n$ term. $4 \times 1 = 4$
but the first term is 1, so subtract 3.
So the rule is $4n - 3$ *[1 mark]*.
$4n - 3 = 113 \Rightarrow 4n = 116 \Rightarrow n = 29$
As this is a whole number, 113 is in
the sequence. *[1 mark]*