Unit 13 · Equation, Inequality and Graph

HARDER PRACTICE QUESTIONS · ANSWER KEY

Full marks 30

Give the marks for the points in the marking scheme; an answer in other words that says the same is right.

1 True, false or open?

ANSWER U · 4

i. **True**: $42 = 7 \times 6$.

ii. **False**: 2 is a prime number, and it is even.

iii. **Open**: true for $x = 6$ ($11 > 9$), false for $x = 3$ (8 is not more than 9).

iv. **False**: $3 + 5 = 8$, which is even.

MARKING SCHEME

✓ i. True.

✓ ii. False, with 2.

✓ iii. Open, with a value each way.

✓ iv. False, with an example.

2 Spot the error

ANSWER U · 3

i. $28 \div 4 + 2 = 7 + 2 = 9$, not 5.

ii. 2 was **added** to $\frac{x}{4}$, so it must be **taken away** from both sides; he added it to 5.

iii. $\frac{x}{4} = 5 - 2 = 3$, so $x = 3 \times 4 = \mathbf{12}$. Check: $12 \div 4 + 2 = 5$ ✓

MARKING SCHEME

✓ The check gives 9, not 5.

✓ 2 should be subtracted from both sides.

✓ $x = 12$.

3 The bags on the balance

ANSWER A · 3

i. $\mathbf{3x + 4 = 19}$.

ii. Take 4 from both sides (axiom of subtraction): $3x = 15$. Divide both sides by 3 (axiom of division): $\mathbf{x = 5}$. Check: $3 \times 5 + 4 = 19$ ✓

iii. A bag weighs 5 marbles, so **5 marbles** (axiom of subtraction again).

MARKING SCHEME

✓ $3x + 4 = 19$.

✓ $x = 5$, with the axioms named.

✓ 5 marbles.

4 Think of a number

ANSWER A · 3

i. $\mathbf{4x - 7 = 29}$.

ii. Add 7 to both sides: $4x = 36$. Divide by 4: $\mathbf{x = 9}$. Check: $36 - 7 = 29$ ✓

iii. $4y - 7 = 1$, so $4y = 8$ and $\mathbf{y = 2}$.

MARKING SCHEME

✓ $4x - 7 = 29$.

✓ 9.

✓ 2.

Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking

5 The change left over

ANSWER A · 3

i. **$50 - 3p = 14$.**

ii. Add $3p$ to both sides: $50 = 14 + 3p$. Take 14 from both sides: $36 = 3p$. Divide by 3: $p = \mathbf{12}$, Rs 12 a pen. (Or: she spent $50 - 14 =$ Rs 36 on the pens, so $3p = 36$.) Check: $50 - 36 = 14$ ✓

iii. **No**: 5 pens cost $5 \times 12 =$ Rs 60, more than Rs 50.

MARKING SCHEME

✓ $50 - 3p = 14$.

✓ Rs 12.

✓ No, 5 pens cost Rs 60.

6 Words into inequalities

ANSWER A · 4

i. $h \geq$ **120**: a **filled** dot at 120 (120 itself is allowed), the line going to the **right**.

ii. $p <$ **8**: an **empty** dot at 8 (8 is not allowed), the line going to the **left**.

iii. **0, 1, 2, 3, 4, 5, 6 or 7** people: a number of people is a whole number.

iv. **No**: $119 < 120$, so $h \geq 120$ is false for her.

MARKING SCHEME

✓ $h \geq 120$, filled dot, to the right.

✓ $p < 8$, empty dot, to the left.

✓ 0 to 7.

✓ No, since $119 < 120$.

7 Which whole numbers?

ANSWER HA · 3

i. Try values: $x = 5$ gives $11 < 12$, true; $x = 6$ gives 13, false, and bigger values give more. So $x =$ **0, 1, 2, 3, 4, 5**.

ii. More than 2 and at most 6: **3, 4, 5, 6**.

iii. **None**: $3x + 1$ is always 1 more than $3x$, so the two sides are never equal.

MARKING SCHEME

✓ 0, 1, 2, 3, 4, 5.

✓ 3, 4, 5, 6.

✓ No number, with the reason.

8 Make your own

ANSWER A · 3

For example, **$5x - 3 = 17$**: "Tashi picked the same number of oranges from each of 5 trees. She gave 3 to a friend and had 17 left. How many did she pick from each tree?" Add 3: $5x = 20$; divide by 5: $x =$ **4** oranges from each tree.

Any equation of the form (number) $\times x -$ (number) = (its value at $x = 4$) is right, with a story that fits it.

MARKING SCHEME

✓ An equation with multiplying, then taking away.

✓ Its solution is 4.

✓ A story that fits it, solved.

9 Think: father and son

ANSWER

i. **$x + 26$**.

ii. $x + x + 26 = 50$, that is **$2x + 26 = 50$**.

iii. Take 26 from both sides: $2x = 24$. Divide by 2: $x = 12$. Sonam is **12** and his father **38**. Check: $12 + 38 = 50$ ✓

Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking

iv. Each year the sum grows by 2. It must grow by $70 - 50 = 20$, so in **10 years** (Sonam 22, father 48). HA · 4

MARKING SCHEME

- ✓ $x + 26$.
- ✓ $2x + 26 = 50$.
- ✓ 12 and 38.
- ✓ 10 years.

Marks by level	Knowledge	Understanding	Application	Higher ability	Total
Marks	0	7	16	7	**30**

Science Playground, Katunje, Bhaktapur
Book a class visit: https://science-playground.com/booking