Shape-Variable Equation Puzzles: Solve by Substitution

Original tasks 1, 2, 3, 4 / complete keys

Task 1

A square plus a star equals 10. Two squares plus a star equals 16. Find the square and the star.

Answer: Square equals 6 and star equals 4.

Reason: Let s be the square and r the star. Equations: s + r = 10 and 2s + r = 16. Subtract: s = 6. Substitute: 6 + r = 10, so r = 4. Check: 6 + 4 = 10 and 12 + 4 = 16.

Check: Substitute 6 and 4 into both original equations and confirm both are true.

Task 2

A circle plus a triangle equals 12. A circle plus two triangles equals 17. Find the circle and the triangle.

Answer: Circle equals 7 and triangle equals 5.

Reason: Let c be the circle and t the triangle. Equations: c + t = 12 and c + 2t = 17. Subtract: t = 5. Substitute: c + 5 = 12, so c = 7. Check: 7 + 5 = 12 and 7 + 10 = 17.

Check: Replace c with 7 and t with 5 in both equations and verify equality.

Task 3

Three hearts equal 12. A heart plus a diamond equals 9. Find the heart and the diamond.

Answer: Heart equals 4 and diamond equals 5.

Reason: Let h be the heart and d the diamond. From 3h = 12, h = 4. Substitute into h + d = 9: 4 + d = 9, so d = 5. Check: 3(4) = 12 and 4 + 5 = 9.

Check: Confirm 3 times 4 is 12 and 4 plus 5 is 9.

Task 4

Two moons plus a sun equals 14. A moon plus a sun equals 9. Find the moon and the sun.

Answer: Moon equals 5 and sun equals 4.

Reason: Let m be the moon and u the sun. Equations: 2m + u = 14 and m + u = 9. Subtract: m = 5. Substitute: 5 + u = 9, so u = 4. Check: 10 + 4 = 14 and 5 + 4 = 9.

Check: Substitute 5 and 4 into both equations and confirm both results match the given totals.

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Source rubric / reflection

- [ ] Legend assigns one letter to each distinct shape.
- [ ] Each picture equation is translated correctly.
- [ ] Substitution replaces every occurrence of the known shape.
- [ ] Arithmetic is correct and units are consistent.
- [ ] Final values are checked in all original equations.
- [ ] Workspace shows one substitution per line.
- [ ] Alternative valid solution routes are accepted if checking is complete.

Reflection: What did you check, what did you change, and what will you try next?