

Mixtures, solutions and dissolving

Grade 6 science (Year 7 · Class 6) · Worksheet answers

Compare your working with the answers. For calculations, check that you added the mass of solute and solvent correctly and wrote the unit. For explanations, look for the words particles, spread out, dissolve and saturated.

Level: Grade 6 science (Year 7 · Class 6) · **Curriculum:** MS-PS1-2

Problem 1 Uniform or not?

1. **Homogeneous.**
2. **Heterogeneous.**
3. **Heterogeneous.**
4. **Homogeneous.**
5. **Homogeneous.**
6. **Heterogeneous.**

Problem 2 Key words

Solute = **B**; solvent = **D**; solution = **A**; dissolving = **C**.

Problem 3 Solute and solvent

1. Solute: sugar; solvent: **water (chai)**.
2. Solute: salt; solvent: **water**.
3. Solute: **orange squash powder**; solvent: water.

Problem 4 Three beakers

1. **Beaker X** holds a solution.
2. In Y the oil floats as a separate layer on top of the water.
3. Z is **heterogeneous**.

Problem 5 Mass of a solution

1. $30\text{ g} + 170\text{ g} = \mathbf{200\text{ g}}$.
2. **30 g** of sugar is in the solution.

Problem 6 Faster dissolving

1. **Yes.**
2. **No.**

3. **Yes.**
4. **Yes.**

Problem 7 True or false

1. False: the solute is the substance that dissolves; the solvent is the liquid.
2. **True.**
3. False: sand does not dissolve in water.
4. **True.**

Problem 8 Finding the solvent mass

1. $350\text{ g} - 50\text{ g} = \mathbf{300\text{ g}}$ of water.
2. $350\text{ g} + 100\text{ g} = \mathbf{450\text{ g}}$.

Problem 9 Reaching saturation

1. Between **30 g and 40 g**.
2. $40\text{ g} - 36\text{ g} = \mathbf{4\text{ g}}$.
3. Warm the mixture slightly, or add more water.

Problem 10 Hot chai, cold chai

1. In hot water the particles move faster, shown by longer arrows.
2. Fast water particles hit the sugar more often and with more energy, so **the sugar particles are pulled away sooner**.

Problem 11 Reading a solubility graph

1. **64 g**.
2. $110 - 32 = \mathbf{78\text{ g}}$ more.
3. At $60\text{ }^{\circ}\text{C}$ up to 110 g can dissolve, so 90 g is **not saturated** (it could take 20 g more).

Problem 12 Alloys and gases

1. **Homogeneous.**
2. Solute: carbon dioxide; solvent: water.
3. Opening the bottle lowers the pressure, so less gas can stay dissolved and it escapes as bubbles.

Problem 13 Spot the errors

1. Dissolved sugar does not disappear: its mass is still there.
2. $20\text{ g} + 100\text{ g} = \mathbf{120\text{ g}}$.

Problem 14 A muddy puddle

1. **No**, it is a heterogeneous mixture.
2. The mud particles slowly sank to the bottom, so the water became clearer. In a solution, nothing would settle.

Problem 15 Sharing a drink

1. $18 + 250 = \mathbf{268\text{ g}}$.
2. $268 \div 4 = \mathbf{67\text{ g}}$.
3. $18 \div 4 = \mathbf{4.5\text{ g}}$ of sugar, because the drink is the same everywhere.

Problem 16 Saturating a larger tank

1. 250 g is $2.5 \times 100\text{ g}$, so $2.5 \times 36\text{ g} = \mathbf{90\text{ g}}$.
2. $100 - 90 = \mathbf{10\text{ g}}$.
3. $250 + 90 = \mathbf{340\text{ g}}$.

Problem 17 Cooling a hot solution

1. At $60\text{ }^{\circ}\text{C}$ up to 110 g can dissolve, so **not saturated**.
2. **32 g** at $20\text{ }^{\circ}\text{C}$.
3. $90 - 32 = \mathbf{58\text{ g}}$ of solid appears.

Problem 18 Plan a solubility test

1. Add salt in small portions to 100 g of water, stirring, until no more dissolves; weigh how much was added. Repeat with sugar.
2. Same water mass, same temperature ($20\text{ }^{\circ}\text{C}$), same stirring.
3. Measure the **mass of solute dissolved**; saturation is reached when some solid stays at the bottom after stirring.

Problem 19 Does hot water dissolve more?

1. Sugar: $287 - 204 = 83\text{ g}$. Salt: $37.1 - 35.9 = 1.2\text{ g}$. Baking soda: $16.4 - 9.6 = 6.8\text{ g}$.
2. Sugar: $83 \div 204 = 41\%$. Salt: $1.2 \div 35.9 = 3\%$. Baking soda: $6.8 \div 9.6 = 71\%$.
3. The claim is true for these three, but the increase varies greatly. Salt hardly changes, so **"always" is too strong a word**; the claim is only partly supported.

Problem 20 Dilution thinking

1. $12 + 188 = \mathbf{200\text{ g}}$.
2. $200 + 100 = \mathbf{300\text{ g}}$.
3. It stays at **12 g**.
4. The same salt is now spread through a larger mass of solution, so each sip contains less

| salt.