Vertex Academy

Year 7 Science workbook

9 worksheets · answers at the back

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Year 7 Science: The particle model: solids, liquids, gases and changes of state

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Which state of matter has particles touching each other but able to slide past one another?

2. Name the change of state when a puddle dries up on a sunny day.

3. Naphthalene mothballs slowly get smaller in a wardrobe without ever becoming liquid. Which change of state is this?

4. Why does a gas fill its whole container while a liquid sits at the bottom?

5. A class heats wax. Its temperature stays at 55 °C for 4 minutes while it turns to liquid. What is happening during those 4 minutes?

Fix the mistake

6. Correct this statement: "When ice melts, the particles themselves melt and get softer."

7. Correct this statement: "There is air between the particles in a gas."

8. Correct this statement: "The drops on the outside of a cold drink leaked through the glass."

9. Correct this statement: "Condensation happens when something is heated."

Year 7 Science: Expansion, density, and why ice floats

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Why do railway lines have small gaps between sections of track?

2. A solid block of chocolate sinks when dropped into melted chocolate. What does that tell you about the density of solid chocolate?

3. A 200 g ice block melts in a sealed bag. What is the mass of the water afterwards?

4. A student says that when water boils, its particles grow bigger to make steam. Correct the student.

5. Why does a can of fizzy drink left in the freezer sometimes burst?

Fix the mistake

6. Correct this statement: "Things expand when heated because the particles themselves get bigger."

7. Correct this statement: "Ice floats because it has air bubbles trapped in it."

8. Correct this statement: "When water evaporates, its mass is destroyed."

9. Correct this statement: "Ice has a bigger volume than the water it came from, so it must have more mass."

Year 7 Science: Temperature, thermal energy and choosing insulators

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Which has more kinetic energy: a car at 30 km/h or the same car at 60 km/h?

2. Name the way heat travels from the Sun to Earth.

3. Why are saucepan handles often made of plastic or wood?

4. In a class test, a can wrapped in foil dropped 12 °C and one wrapped in felt dropped 5 °C. Which material is the better insulator?

5. Why does a puffer jacket keep you warm even though it is very light?

Fix the mistake

6. Correct this statement: "A metal bench feels colder because metal is colder than wood."

7. Correct this statement: "A jersey makes heat to keep you warm."

8. Correct this statement: "Temperature and thermal energy are the same thing."

9. Correct this statement: "Cold flows into your hands from a cold drink can."

Year 7 Science: Speed: measuring it, calculating it and graphing it

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. A tūī flies 120 m in 8 s. What is its speed?

2. Convert 5 m/s into km/h.

3. A ferry travels at 30 km/h for 2 hours. How far does it go?

4. On a distance-time graph, line A is steeper than line B. Which object is faster?

5. Three timings of a falling ball are 0.6 s, 0.9 s and 0.6 s. Why should the class be careful about trusting these?

Fix the mistake

6. Correct this statement: "Speed = time ÷ distance, so 100 m in 20 s is 0.2 m/s."

7. Correct this statement: "A flat line on a distance-time graph means moving at a steady speed."

8. Correct this statement: "Dividing 3 km by 20 minutes gives a speed of 0.15 km/h."

9. Correct this statement: "If I measure once very carefully, I do not need repeats."

Year 7 Science: The Moon's phases, and why it rises later each day

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. What do we call the phase when the Moon is between Earth and the Sun?

2. From New Zealand, a half Moon is lit on its left side. Is it first quarter or last quarter?

3. A full moon is on 23 January 2027. Roughly when will the next full moon be?

4. The Moon rises at 7:00 pm tonight. At about what time will it rise tomorrow?

5. Why do we see phases at all, if half the Moon is always lit?

Fix the mistake

6. Correct this statement: "The phases are caused by Earth's shadow falling on the Moon."

7. Correct this statement: "The Moon only comes out at night."

8. Correct this statement: "A first quarter moon is a quarter lit."

9. Correct this statement: "The Moon gives off its own light."

Year 7 Science: The Moon as a clock, the maramataka, and eclipses

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Full moon is on 24 December 2026. Roughly when is the next last quarter?

2. Which phase must the Moon be in for a solar eclipse?

3. In a lunar eclipse, which body is in the middle of the line?

4. Why do iwi in different regions have different maramataka?

5. Why is a solar eclipse seen only from a small part of Earth, while a lunar eclipse is seen by everyone on the night side?

Fix the mistake

6. Correct this statement: "A solar eclipse is when Earth's shadow covers the Sun."

7. Correct this statement: "There must be an eclipse every new moon and full moon."

8. Correct this statement: "The maramataka is the same everywhere in New Zealand."

9. Correct this statement: "A lunar eclipse can happen at any phase."

Year 7 Science: Survival adaptations: how living things fit their environment

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Is a kiwi's long beak a structural, behavioural or physiological adaptation?

2. Hedgehogs roll into a ball of spines when threatened. Is this adaptation for getting resources, avoiding hazards or reproducing?

3. A white rabbit lives on a snowy hillside. The snow melts and leaves brown grass and rock. What happens to its chances of survival, and why?

4. In a camouflage hunt, 10 of 25 brown beads survived on a lawn. What percentage survived?

5. A student says that because a bodybuilder lifts weights, their baby will be born strong. Whose idea is this, and why is it wrong?

Fix the mistake

6. Correct this statement: "An animal grows an adaptation because it needs it."

7. Correct this statement: "An adaptation means the animal will always survive."

8. Correct this statement: "Penguins huddling is a structural adaptation."

9. Correct this statement: "A good adaptation works in any environment."

Year 7 Science: Cells: the building blocks of life

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. Which organelle controls the cell and holds its instructions?

2. Name two parts found in plant cells but not animal cells.

3. A microscope has a 10× eyepiece and a 10× objective. What is the total magnification?

4. Is the lung a cell, a tissue, an organ or an organ system?

5. A cell has a long tail and many mitochondria. What is it specialised for?

Fix the mistake

6. Correct this statement: "Plant cells have a cell wall instead of a cell membrane."

7. Correct this statement: "Every plant cell has chloroplasts."

8. Correct this statement: "An organ is made of just one kind of cell."

9. Correct this statement: "Magnification is eyepiece plus objective, so 10× and 40× gives 50×."

Year 7 Science: Populations, communities and ecosystems

Name: _____ Date: _____

Try these without your notes first, then check the answer key.

Practice

1. All the pōhutukawa trees on one headland this year form a what?

2. Is the temperature of a rock pool a biotic or an abiotic factor?

3. In the bush food web, name one producer and one top predator.

4. Which way does an arrow point in a food web: from the food or from the eater?

5. Fungi on a fallen log break it down. What role do the fungi have, and why does the ecosystem need them?

Fix the mistake

6. Correct this statement: "In a food web, the arrow points from the eater to its food."

7. Correct this statement: "A population is all the animals living in an area."

8. Correct this statement: "An ecosystem is only the living things in a place."

9. Correct this statement: "Removing a predator only affects the animals it eats."

Answer key (for parents and tutors)

1. Which state of matter has particles touching each other but able to slide past one another?
   A liquid.
2. Name the change of state when a puddle dries up on a sunny day.
   Evaporation (liquid to gas).
3. Naphthalene mothballs slowly get smaller in a wardrobe without ever becoming liquid. Which change of state is this?
   Sublimation (solid straight to gas).
4. Why does a gas fill its whole container while a liquid sits at the bottom?
   Gas particles have only weak attractions and move fast in all directions, so they spread out; liquid particles are held close together by attraction.
5. A class heats wax. Its temperature stays at 55 °C for 4 minutes while it turns to liquid. What is happening during those 4 minutes?
   The wax is melting: the thermal energy is breaking the particles out of their fixed pattern instead of raising the temperature.
6. Correct this statement: "When ice melts, the particles themselves melt and get softer."
   The particles do not change at all; they just move faster and leave their fixed pattern.
7. Correct this statement: "There is air between the particles in a gas."
   Between gas particles there is empty space; air is itself made of particles.
8. Correct this statement: "The drops on the outside of a cold drink leaked through the glass."
   They are water vapour from the air that condensed on the cold glass.
9. Correct this statement: "Condensation happens when something is heated."
   Condensation happens when a gas loses thermal energy and cools into a liquid.

Answer key (for parents and tutors)

1. Why do railway lines have small gaps between sections of track?
   The steel expands on hot days, and the gaps give it room so the track does not buckle.
2. A solid block of chocolate sinks when dropped into melted chocolate. What does that tell you about the density of solid chocolate?
   Solid chocolate is denser than liquid chocolate, like most substances.
3. A 200 g ice block melts in a sealed bag. What is the mass of the water afterwards?
   200 g, because mass is conserved in a change of state.
4. A student says that when water boils, its particles grow bigger to make steam. Correct the student.
   The particles stay the same size; they move much faster and spread far apart.
5. Why does a can of fizzy drink left in the freezer sometimes burst?
   Most of the drink is water, which expands as it freezes, so the ice needs more room than the can has.
6. Correct this statement: "Things expand when heated because the particles themselves get bigger."
   The particles stay the same size; they move faster and spread further apart.
7. Correct this statement: "Ice floats because it has air bubbles trapped in it."
   Even clear ice floats, because its particles are held in an open pattern that makes it less dense than water.
8. Correct this statement: "When water evaporates, its mass is destroyed."
   The particles spread into the air as water vapour, so the mass is still there, just in the air.
9. Correct this statement: "Ice has a bigger volume than the water it came from, so it must have more mass."
   The mass stays the same; the same particles just take up more room, so the density goes down.

Answer key (for parents and tutors)

1. Which has more kinetic energy: a car at 30 km/h or the same car at 60 km/h?
   The car at 60 km/h, because it is moving faster.
2. Name the way heat travels from the Sun to Earth.
   Radiation, which needs no material to travel through.
3. Why are saucepan handles often made of plastic or wood?
   They have low thermal conductivity, so the handle stays cool enough to hold.
4. In a class test, a can wrapped in foil dropped 12 °C and one wrapped in felt dropped 5 °C. Which material is the better insulator?
   Felt, because its can lost the least heat (5 °C compared with 12 °C).
5. Why does a puffer jacket keep you warm even though it is very light?
   Its filling traps a lot of still air, which is a very poor conductor, so body heat escapes slowly.
6. Correct this statement: "A metal bench feels colder because metal is colder than wood."
   Both are the same temperature; metal is a better conductor, so it draws heat from your hand faster.
7. Correct this statement: "A jersey makes heat to keep you warm."
   A jersey makes no heat; it is an insulator that slows the loss of your own body heat.
8. Correct this statement: "Temperature and thermal energy are the same thing."
   Temperature is the average particle energy; thermal energy is the total, so a big cool bath can hold more than a small hot cup.
9. Correct this statement: "Cold flows into your hands from a cold drink can."
   Heat flows out of your hands into the can; heat always moves from hotter to colder.

Answer key (for parents and tutors)

1. A tūī flies 120 m in 8 s. What is its speed?
   120 ÷ 8 = 15 m/s.
2. Convert 5 m/s into km/h.
   5 × 3.6 = 18 km/h.
3. A ferry travels at 30 km/h for 2 hours. How far does it go?
   30 × 2 = 60 km.
4. On a distance-time graph, line A is steeper than line B. Which object is faster?
   A, because a steeper line means more distance in each second.
5. Three timings of a falling ball are 0.6 s, 0.9 s and 0.6 s. Why should the class be careful about trusting these?
   The times are very short and do not agree, so reaction time causes large errors; drop from higher or film it.
6. Correct this statement: "Speed = time ÷ distance, so 100 m in 20 s is 0.2 m/s."
   Speed is distance ÷ time: 100 m ÷ 20 s = 5 m/s.
7. Correct this statement: "A flat line on a distance-time graph means moving at a steady speed."
   A flat line means the distance is not changing, so the object is stopped; a steady speed is a straight sloping line.
8. Correct this statement: "Dividing 3 km by 20 minutes gives a speed of 0.15 km/h."
   Change the time to hours first: 20 min = 1/3 h, so 3 km ÷ 1/3 h = 9 km/h.
9. Correct this statement: "If I measure once very carefully, I do not need repeats."
   Repeats show whether results agree and let you take a mean, which reduces the effect of reaction-time errors.

Answer key (for parents and tutors)

1. What do we call the phase when the Moon is between Earth and the Sun?
   New moon.
2. From New Zealand, a half Moon is lit on its left side. Is it first quarter or last quarter?
   First quarter, because from New Zealand a waxing Moon is lit on the left.
3. A full moon is on 23 January 2027. Roughly when will the next full moon be?
   About 29.5 days later, around 21 or 22 February 2027.
4. The Moon rises at 7:00 pm tonight. At about what time will it rise tomorrow?
   About 50 minutes later, at around 7:50 pm.
5. Why do we see phases at all, if half the Moon is always lit?
   As the Moon orbits Earth, we see different amounts of its lit half.
6. Correct this statement: "The phases are caused by Earth's shadow falling on the Moon."
   Phases come from how much of the Moon's sunlit half we can see; Earth's shadow only reaches the Moon in a lunar eclipse.
7. Correct this statement: "The Moon only comes out at night."
   The Moon is up for about half of each day, and you can often see it in daylight, especially near the quarter phases.
8. Correct this statement: "A first quarter moon is a quarter lit."
   At first quarter, half the disc is lit; the name means the Moon is a quarter of the way through its cycle.
9. Correct this statement: "The Moon gives off its own light."
   The Moon only reflects sunlight; half of it is always lit by the Sun.

Answer key (for parents and tutors)

1. Full moon is on 24 December 2026. Roughly when is the next last quarter?
   About a week later, around 31 December 2026.
2. Which phase must the Moon be in for a solar eclipse?
   New moon.
3. In a lunar eclipse, which body is in the middle of the line?
   Earth, between the Sun and the Moon.
4. Why do iwi in different regions have different maramataka?
   Each region has its own climate, plants and animals, so the tohu and best times differ.
5. Why is a solar eclipse seen only from a small part of Earth, while a lunar eclipse is seen by everyone on the night side?
   The Moon's shadow on Earth is small, but in a lunar eclipse the whole Moon goes into Earth's shadow, so everyone who can see the Moon sees it darken.
6. Correct this statement: "A solar eclipse is when Earth's shadow covers the Sun."
   In a solar eclipse the Moon blocks the Sun; Earth's shadow on the Moon is a lunar eclipse.
7. Correct this statement: "There must be an eclipse every new moon and full moon."
   The Moon's orbit is tilted, so most months the three bodies do not line up exactly.
8. Correct this statement: "The maramataka is the same everywhere in New Zealand."
   Each iwi and region has its own maramataka, fitted to local signs and conditions.
9. Correct this statement: "A lunar eclipse can happen at any phase."
   A lunar eclipse needs Earth between the Sun and the Moon, which only happens at full moon.

Answer key (for parents and tutors)

1. Is a kiwi's long beak a structural, behavioural or physiological adaptation?
   Structural, because it is a body feature.
2. Hedgehogs roll into a ball of spines when threatened. Is this adaptation for getting resources, avoiding hazards or reproducing?
   Avoiding hazards.
3. A white rabbit lives on a snowy hillside. The snow melts and leaves brown grass and rock. What happens to its chances of survival, and why?
   Its chances fall, because it now stands out against the brown background and predators spot it more easily.
4. In a camouflage hunt, 10 of 25 brown beads survived on a lawn. What percentage survived?
   10 ÷ 25 × 100 = 40%.
5. A student says that because a bodybuilder lifts weights, their baby will be born strong. Whose idea is this, and why is it wrong?
   Lamarck's idea that acquired traits are inherited; muscles built during a lifetime are not passed on to children.
6. Correct this statement: "An animal grows an adaptation because it needs it."
   Adaptations are inherited traits; individuals that already have a useful trait survive and pass it on.
7. Correct this statement: "An adaptation means the animal will always survive."
   An adaptation only improves the chances of surviving and reproducing; it is never a guarantee.
8. Correct this statement: "Penguins huddling is a structural adaptation."
   Huddling is something penguins do, so it is behavioural; structural means a body feature.
9. Correct this statement: "A good adaptation works in any environment."
   How well an adaptation works depends on the conditions, as camouflage shows on different backgrounds.

Answer key (for parents and tutors)

1. Which organelle controls the cell and holds its instructions?
   The nucleus.
2. Name two parts found in plant cells but not animal cells.
   Any two of: cell wall, chloroplasts, large vacuole.
3. A microscope has a 10× eyepiece and a 10× objective. What is the total magnification?
   10 × 10 = 100×.
4. Is the lung a cell, a tissue, an organ or an organ system?
   An organ, because it is made of several tissues working together.
5. A cell has a long tail and many mitochondria. What is it specialised for?
   Movement: the tail swims and the mitochondria release the energy it needs, as in a sperm cell.
6. Correct this statement: "Plant cells have a cell wall instead of a cell membrane."
   Plant cells have both: the membrane sits just inside the cell wall.
7. Correct this statement: "Every plant cell has chloroplasts."
   Only cells in the green parts have chloroplasts; root cells, for example, have none.
8. Correct this statement: "An organ is made of just one kind of cell."
   An organ is made of several tissues, such as the muscle, nerve and lining tissues in the heart.
9. Correct this statement: "Magnification is eyepiece plus objective, so 10× and 40× gives 50×."
   Multiply the two: 10 × 40 = 400×.

Answer key (for parents and tutors)

1. All the pōhutukawa trees on one headland this year form a what?
   A population, because it is one species in one place at one time.
2. Is the temperature of a rock pool a biotic or an abiotic factor?
   Abiotic, because temperature is not living.
3. In the bush food web, name one producer and one top predator.
   Producer: tawa or harakeke; top predator: the stoat or the ruru, since nothing in the web eats them.
4. Which way does an arrow point in a food web: from the food or from the eater?
   From the food to the eater.
5. Fungi on a fallen log break it down. What role do the fungi have, and why does the ecosystem need them?
   They are decomposers; they return nutrients from dead material to the soil so producers can use them again.
6. Correct this statement: "In a food web, the arrow points from the eater to its food."
   The arrow points from the food to the eater, showing the way energy flows.
7. Correct this statement: "A population is all the animals living in an area."
   A population is just one species; all the species together make a community.
8. Correct this statement: "An ecosystem is only the living things in a place."
   An ecosystem includes the non-living parts too, such as water, soil, light and temperature.
9. Correct this statement: "Removing a predator only affects the animals it eats."
   The change spreads through the web, reaching plants, other predators and the species that depend on them.