Vertex Academy

Year 8 Science workbook

11 worksheets · answers at the back

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Year 8 Science: Mixtures, solutions, concentration and separating

Name: _____ Date: _____

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

Practice

1. Muddy water from a creek is left in a jar overnight and a layer of soil forms on the bottom. Was it a solution or a suspension?

2. Drink A has 15 g of sugar in 500 mL. Drink B has 12 g in 250 mL. Which is more concentrated?

3. You stir sugar into cold water until some stays at the bottom however long you stir. What word describes the solution, and what could you change so more dissolves?

4. Which method would you use to separate gravel from sand?

5. In a chromatogram of a green food colouring, a yellow spot is near the top and a blue spot is lower. Which dye clings more strongly to the paper?

Fix the mistake

6. Correct this statement: "When salt dissolves in water it disappears, so the salt is gone."

7. Correct this statement: "A solution with more grams of solute is always more concentrated."

8. Correct this statement: "Flour stirred into water is a solution."

9. Correct this statement: "In chromatography, draw the start line in pen and put it under the water."

Year 8 Science: How we see: light sources, reflection and refraction

Name: _____ Date: _____

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

Practice

1. Is the Moon a light source? Explain how we see it.

2. A ray hits a mirror with an angle of incidence of 25°. What is the angle of reflection?

3. A ray makes an angle of 70° with a mirror surface. What is the angle of reflection?

4. A ray of light passes from air into a glass block at an angle. Does it bend towards or away from the normal?

5. What evidence did Ibn al-Haytham use against the idea that sight comes from rays leaving the eye?

Fix the mistake

6. Correct this statement: "We see a book because light comes out of our eyes and hits it."

7. Correct this statement: "The angle of incidence is measured between the ray and the mirror."

8. Correct this statement: "Refraction is when light bounces off water."

9. Correct this statement: "A ray going into glass always bends."

Year 8 Science: Balanced and unbalanced forces, and free body diagrams

Name: _____ Date: _____

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

Practice

1. A skateboarder rolls along at a steady speed in a straight line. Are the forces on her balanced or unbalanced?

2. A tug of war team pulls left with 500 N and the other pulls right with 450 N. What is the net force, and which way will the rope move?

3. A free body diagram of a falling apple shows weight 2 N down and air resistance 0.5 N up. What is the net force, and what happens to the apple's speed?

4. A car goes round a roundabout at a steady 30 km/h. Is there an unbalanced force on it?

5. Why should each trial in a fair test be repeated three times?

Fix the mistake

6. Correct this statement: "If something is moving, there must be an unbalanced force pushing it along."

7. Correct this statement: "Balanced forces means the object is not moving."

8. Correct this statement: "If the speed stays the same, the motion has not changed."

9. Correct this statement: "On a free body diagram, draw all the arrows the same length."

Year 8 Science: Mass, unbalanced forces and balancing a seesaw

Name: _____ Date: _____

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

Practice

1. The same push is given to a 5 kg box and a 20 kg box on the same smooth floor. Which speeds up more?

2. A 300 N force acts 2 m from a pivot. What is its turning effect?

3. A 500 N person sits 1.2 m from a seesaw's pivot. How far from the pivot must a 400 N person sit to balance?

4. On a seesaw, the left side has 800 N m of turning effect and the right side 650 N m. Which way does it tip?

5. Why is it easier to open a door by pushing near the handle than near the hinges?

Fix the mistake

6. Correct this statement: "A seesaw balances when the two people weigh the same."

7. Correct this statement: "Turning effect = force + distance."

8. Correct this statement: "A heavy object needs a force to keep moving at a steady speed but a light one does not."

9. Correct this statement: "Measure the distance from the end of the seesaw."

Year 8 Science: Earth's layers, minerals and rocks

Name: _____ Date: _____

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

Practice

1. Name the four layers of the Earth from the outside in.

2. Is glass a mineral? Explain.

3. Rock X scratches glass. Rock Y can be scratched by a copper coin. Which is harder?

4. A rock has thin layers of rounded sand grains and no crystals. Which rock from the example is it most like?

5. A rock near the top of a hill contains fossil fish. What does this tell you about the past?

Fix the mistake

6. Correct this statement: "Rocks and minerals are the same thing."

7. Correct this statement: "The Earth's core is hot liquid all the way through."

8. Correct this statement: "A shiny or brightly coloured rock must be hard."

9. Correct this statement: "Fossils found on a mountain mean sea animals once lived on mountains."

Year 8 Science: The rock cycle, fossils, soil and using Earth materials

Name: _____ Date: _____

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

Practice

1. A rock has large interlocking crystals. Is it more likely to have cooled quickly at the surface or slowly underground?

2. Which type of rock forms when limestone is changed by heat and pressure into marble?

3. Name the three processes, in order, that move a rock at the surface into a new sediment layer.

4. Why are fossils rarely found in igneous rock?

5. Why is aluminium chosen over steel for an aircraft body?

Fix the mistake

6. Correct this statement: "Metamorphic rock forms when rock melts and cools again."

7. Correct this statement: "The rock cycle always goes igneous, sedimentary, metamorphic in that order."

8. Correct this statement: "A fossil is the actual bone or shell of the animal."

9. Correct this statement: "Soil is just ground-up rock."

Year 8 Science: Evidence for evolution, variation and natural selection

Name: _____ Date: _____

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

Practice

1. Give two kinds of evidence that species change over time.

2. Is a tattoo heritable variation? Explain.

3. In a dry year, only finches with thick, strong beaks can crack the remaining hard seeds. What is the selection pressure?

4. In Room 7's activity, what would you expect if the toothpicks were scattered on red carpet instead?

5. Give one way habitat destruction can cause extinction.

Fix the mistake

6. Correct this statement: "A theory in science is just a hunch."

7. Correct this statement: "A giraffe that stretches its neck will have longer-necked babies."

8. Correct this statement: "Animals choose to change so they can survive a new environment."

9. Correct this statement: "The strongest individual always survives natural selection."

Year 8 Science: Darwin, Wallace, new species and common ancestry

Name: _____ Date: _____

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

Practice

1. Why was it important that Wallace reached the same idea as Darwin?

2. A rabbit population lives where winter snow now lasts longer. Rabbits with whiter fur are seen less by hawks. What happens to the population over many generations?

3. Can a single rabbit evolve whiter fur? Explain.

4. Kea and kākā look alike but cannot interbreed. What does this tell you about where they came from?

5. A fossil has broad, flat, ridged teeth and was found among fossil leaves. What did it probably eat?

Fix the mistake

6. Correct this statement: "The moths turned dark so they could hide on sooty trees."

7. Correct this statement: "Humans evolved from chimpanzees."

8. Correct this statement: "Darwin came up with natural selection completely on his own."

9. Correct this statement: "Evolution happens to an animal during its lifetime."

Year 8 Science: Sexual and asexual reproduction, and how a mammal develops

Name: _____ Date: _____

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

Practice

1. A flax bush (harakeke) is divided and replanted as five new plants. Is this sexual or asexual reproduction?

2. Why are siblings from the same two parents usually different from each other?

3. What is made at fertilisation?

4. Give the stage that follows the embryo in a mammal.

5. Give one advantage of asexual reproduction.

Fix the mistake

6. Correct this statement: "Plants only reproduce asexually."

7. Correct this statement: "Offspring of sexual reproduction are half copies of each parent, so they look exactly like a blend."

8. Correct this statement: "The zygote, embryo and foetus are three different babies."

9. Correct this statement: "A zygote is a sperm."

Year 8 Science: Hormones, the menstrual cycle, flowers and fungi

Name: _____ Date: _____

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

Practice

1. Give the three parts of the definition of a hormone.

2. What happens to the lining of the uterus if an egg is not fertilised?

3. Which hormone made by the testes keeps sperm production going?

4. Put these in order: germination, pollination, seed dispersal, fertilisation, seed formation.

5. Why can a mould appear on bread in a closed bag, even though nobody put it there?

Fix the mistake

6. Correct this statement: "A hormone works on every cell it reaches in the blood."

7. Correct this statement: "A period is when the egg is released."

8. Correct this statement: "Pollination and fertilisation are the same thing."

9. Correct this statement: "Mushrooms grow from seeds."

Year 8 Science: Producers, consumers, decomposers and how organisms interact

Name: _____ Date: _____

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

Practice

1. In the chain kawakawa → looper caterpillar → tauhou (silvereye), which organism is the producer?

2. Name the role of the fungi growing on a fallen log.

3. A tapeworm lives in a dog's gut and takes its food. What type of relationship is this?

4. In Room 15's transect, at what distance was marram grass cover highest?

5. Why does an ecosystem need a constant supply of energy from the Sun but not a constant supply of new nutrients?

Fix the mistake

6. Correct this statement: "In a food chain the arrow means 'eats', so it points from the ruru to the wētā."

7. Correct this statement: "Decomposers are not important because they only deal with dead things."

8. Correct this statement: "Energy is recycled round an ecosystem like nutrients are."

9. Correct this statement: "Any relationship where two animals live together is mutualism."

Answer key (for parents and tutors)

1. Muddy water from a creek is left in a jar overnight and a layer of soil forms on the bottom. Was it a solution or a suspension?
   A suspension, because the solid settled out; a solution never does.
2. Drink A has 15 g of sugar in 500 mL. Drink B has 12 g in 250 mL. Which is more concentrated?
   Drink B: it has 48 g/L, while A has 30 g/L.
3. You stir sugar into cold water until some stays at the bottom however long you stir. What word describes the solution, and what could you change so more dissolves?
   Saturated; warm the water so it can hold more sugar.
4. Which method would you use to separate gravel from sand?
   Sieving, because the pieces of gravel are bigger than the sand grains.
5. In a chromatogram of a green food colouring, a yellow spot is near the top and a blue spot is lower. Which dye clings more strongly to the paper?
   The blue dye, because it was left lower down the paper.
6. Correct this statement: "When salt dissolves in water it disappears, so the salt is gone."
   The salt is still there as tiny particles spread through the water; evaporating the water gets it back.
7. Correct this statement: "A solution with more grams of solute is always more concentrated."
   Concentration depends on the volume too, so compare grams per litre, not just grams.
8. Correct this statement: "Flour stirred into water is a solution."
   Flour does not dissolve, so it makes a cloudy suspension that settles if left.
9. Correct this statement: "In chromatography, draw the start line in pen and put it under the water."
   Use pencil, which does not run, and keep the line above the water so the spot is carried up, not washed away.

Answer key (for parents and tutors)

1. Is the Moon a light source? Explain how we see it.
   No; sunlight reflects off the Moon and travels to our eyes.
2. A ray hits a mirror with an angle of incidence of 25°. What is the angle of reflection?
   25°, because the angle of reflection always equals the angle of incidence.
3. A ray makes an angle of 70° with a mirror surface. What is the angle of reflection?
   20°: the angle of incidence is 90° − 70° = 20°, and reflection matches it.
4. A ray of light passes from air into a glass block at an angle. Does it bend towards or away from the normal?
   Towards the normal, because light slows down in glass.
5. What evidence did Ibn al-Haytham use against the idea that sight comes from rays leaving the eye?
   Looking at the bright Sun hurts the eyes, which makes sense only if light is entering them; he also tested ideas with experiments in darkened rooms.
6. Correct this statement: "We see a book because light comes out of our eyes and hits it."
   Light from a source reflects off the book and travels into our eyes; arrows on a ray diagram point towards the eye.
7. Correct this statement: "The angle of incidence is measured between the ray and the mirror."
   Both angles are measured from the normal, the line at 90° to the mirror.
8. Correct this statement: "Refraction is when light bounces off water."
   Bouncing off is reflection; refraction is light changing direction as it passes into a new material.
9. Correct this statement: "A ray going into glass always bends."
   A ray that hits the surface along the normal slows down but carries straight on.

Answer key (for parents and tutors)

1. A skateboarder rolls along at a steady speed in a straight line. Are the forces on her balanced or unbalanced?
   Balanced, because her speed and direction are not changing.
2. A tug of war team pulls left with 500 N and the other pulls right with 450 N. What is the net force, and which way will the rope move?
   50 N to the left, so the rope moves left.
3. A free body diagram of a falling apple shows weight 2 N down and air resistance 0.5 N up. What is the net force, and what happens to the apple's speed?
   1.5 N down, so the apple speeds up.
4. A car goes round a roundabout at a steady 30 km/h. Is there an unbalanced force on it?
   Yes; its direction is changing, so the forces on it are unbalanced even though its speed is steady.
5. Why should each trial in a fair test be repeated three times?
   Repeats show whether results are consistent and let you spot a trial that went wrong, and the mean is more trustworthy than one reading.
6. Correct this statement: "If something is moving, there must be an unbalanced force pushing it along."
   A steady speed in a straight line needs balanced forces; an unbalanced force is only needed to change the motion.
7. Correct this statement: "Balanced forces means the object is not moving."
   Balanced forces mean the motion does not change, so a moving object keeps moving at the same speed and direction.
8. Correct this statement: "If the speed stays the same, the motion has not changed."
   Turning is a change in motion too, so a change of direction also needs an unbalanced force.
9. Correct this statement: "On a free body diagram, draw all the arrows the same length."
   Arrow length shows the size of each force, so a 120 N force needs a longer arrow than an 80 N one.

Answer key (for parents and tutors)

1. The same push is given to a 5 kg box and a 20 kg box on the same smooth floor. Which speeds up more?
   The 5 kg box, because less mass needs less force for the same change.
2. A 300 N force acts 2 m from a pivot. What is its turning effect?
   300 × 2 = 600 N m.
3. A 500 N person sits 1.2 m from a seesaw's pivot. How far from the pivot must a 400 N person sit to balance?
   500 × 1.2 = 600 N m, so 600 ÷ 400 = 1.5 m.
4. On a seesaw, the left side has 800 N m of turning effect and the right side 650 N m. Which way does it tip?
   The left side goes down, because its turning effect is bigger.
5. Why is it easier to open a door by pushing near the handle than near the hinges?
   The handle is further from the pivot (the hinges), so the same force gives a bigger turning effect.
6. Correct this statement: "A seesaw balances when the two people weigh the same."
   It balances when the turning effects are equal, so a heavier person can balance a lighter one by sitting closer to the pivot.
7. Correct this statement: "Turning effect = force + distance."
   Turning effect is force multiplied by distance from the pivot, in N m.
8. Correct this statement: "A heavy object needs a force to keep moving at a steady speed but a light one does not."
   Mass decides how big an unbalanced force is needed to change motion, not whether a steady speed needs a force.
9. Correct this statement: "Measure the distance from the end of the seesaw."
   Always measure from the pivot, because that is the point everything turns around.

Answer key (for parents and tutors)

1. Name the four layers of the Earth from the outside in.
   Crust, mantle, outer core, inner core.
2. Is glass a mineral? Explain.
   No: its particles do not form a repeating pattern, so it has no crystals.
3. Rock X scratches glass. Rock Y can be scratched by a copper coin. Which is harder?
   Rock X, because it scratches glass, which is harder than a coin.
4. A rock has thin layers of rounded sand grains and no crystals. Which rock from the example is it most like?
   Sandstone, like sample C.
5. A rock near the top of a hill contains fossil fish. What does this tell you about the past?
   That rock formed under water, so the area was once under the sea or a lake and has since been lifted up.
6. Correct this statement: "Rocks and minerals are the same thing."
   A mineral is one substance with a repeating pattern; a rock is a mixture of one or more minerals.
7. Correct this statement: "The Earth's core is hot liquid all the way through."
   The outer core is liquid, but the inner core is solid because of the enormous pressure.
8. Correct this statement: "A shiny or brightly coloured rock must be hard."
   Colour and shine do not tell you hardness; only a scratch test does.
9. Correct this statement: "Fossils found on a mountain mean sea animals once lived on mountains."
   The rock formed under the sea and was later pushed up to become a mountain.

Answer key (for parents and tutors)

1. A rock has large interlocking crystals. Is it more likely to have cooled quickly at the surface or slowly underground?
   Slowly underground, which gives crystals time to grow large.
2. Which type of rock forms when limestone is changed by heat and pressure into marble?
   Metamorphic rock.
3. Name the three processes, in order, that move a rock at the surface into a new sediment layer.
   Weathering, erosion, then deposition.
4. Why are fossils rarely found in igneous rock?
   Igneous rock forms from molten rock, which would destroy any remains.
5. Why is aluminium chosen over steel for an aircraft body?
   It is strong but much less dense, so the aircraft is lighter.
6. Correct this statement: "Metamorphic rock forms when rock melts and cools again."
   Melting and cooling makes igneous rock; metamorphic rock is changed by heat and pressure without melting.
7. Correct this statement: "The rock cycle always goes igneous, sedimentary, metamorphic in that order."
   Any rock type can turn into any other, so there are many routes round the cycle.
8. Correct this statement: "A fossil is the actual bone or shell of the animal."
   In most fossils, minerals have replaced the original material, leaving a stony copy.
9. Correct this statement: "Soil is just ground-up rock."
   Soil also holds humus, living things, air and water, which is why it can grow plants.

Answer key (for parents and tutors)

1. Give two kinds of evidence that species change over time.
   Any two of: fossils in rock layers, shared features such as the same limb bones, similar DNA.
2. Is a tattoo heritable variation? Explain.
   No, because it is gained during a lifetime and is not in the genes.
3. In a dry year, only finches with thick, strong beaks can crack the remaining hard seeds. What is the selection pressure?
   Shortage of soft food, so only hard seeds are left.
4. In Room 7's activity, what would you expect if the toothpicks were scattered on red carpet instead?
   Red toothpicks would survive better and green ones would be found more often.
5. Give one way habitat destruction can cause extinction.
   Species lose their food and shelter, so if they cannot move or adapt, every individual dies.
6. Correct this statement: "A theory in science is just a hunch."
   A scientific theory is a well-tested explanation supported by many lines of evidence.
7. Correct this statement: "A giraffe that stretches its neck will have longer-necked babies."
   Changes gained during a lifetime are not passed on; only heritable variation is inherited.
8. Correct this statement: "Animals choose to change so they can survive a new environment."
   Variation already exists by chance, and the environment selects which variations survive and breed.
9. Correct this statement: "The strongest individual always survives natural selection."
   The best-suited survive, which might mean the best camouflaged or the one that copes with cold, not the strongest.

Answer key (for parents and tutors)

1. Why was it important that Wallace reached the same idea as Darwin?
   Two people reaching it independently from different evidence made it far more convincing.
2. A rabbit population lives where winter snow now lasts longer. Rabbits with whiter fur are seen less by hawks. What happens to the population over many generations?
   Whiter rabbits survive and breed more, so white fur becomes more common in the population.
3. Can a single rabbit evolve whiter fur? Explain.
   No; an individual's inherited fur colour does not change, only the population's mix changes over generations.
4. Kea and kākā look alike but cannot interbreed. What does this tell you about where they came from?
   They are separate species that evolved from a shared ancestor.
5. A fossil has broad, flat, ridged teeth and was found among fossil leaves. What did it probably eat?
   Plants, because flat ridged teeth grind tough leaves.
6. Correct this statement: "The moths turned dark so they could hide on sooty trees."
   No moth changed colour; dark moths already existed and survived better, so their share of the population grew.
7. Correct this statement: "Humans evolved from chimpanzees."
   Humans and chimpanzees share a common ancestor; neither evolved from the other.
8. Correct this statement: "Darwin came up with natural selection completely on his own."
   Wallace reached the same idea independently, and their work was presented together in 1858.
9. Correct this statement: "Evolution happens to an animal during its lifetime."
   Evolution is a change in a population's inherited traits across generations.

Answer key (for parents and tutors)

1. A flax bush (harakeke) is divided and replanted as five new plants. Is this sexual or asexual reproduction?
   Asexual: there is one parent and the new plants are identical to it.
2. Why are siblings from the same two parents usually different from each other?
   Each gets a different mix of genes from the two parents.
3. What is made at fertilisation?
   A zygote, a single new cell from a sperm and an egg joining.
4. Give the stage that follows the embryo in a mammal.
   The foetus.
5. Give one advantage of asexual reproduction.
   It is fast and needs no partner, so a good habitat can be filled quickly.
6. Correct this statement: "Plants only reproduce asexually."
   Flowering plants reproduce sexually through their flowers, and many can also reproduce asexually.
7. Correct this statement: "Offspring of sexual reproduction are half copies of each parent, so they look exactly like a blend."
   Each offspring gets a different mix of the parents' genes, which is why siblings differ.
8. Correct this statement: "The zygote, embryo and foetus are three different babies."
   They are three stages of the same developing individual, named by how far it has developed.
9. Correct this statement: "A zygote is a sperm."
   A zygote is the single new cell made when a sperm and an egg join at fertilisation.

Answer key (for parents and tutors)

1. Give the three parts of the definition of a hormone.
   A chemical messenger, carried in the blood, that changes how its target cells work.
2. What happens to the lining of the uterus if an egg is not fertilised?
   It breaks down and leaves the body as menstruation, a period.
3. Which hormone made by the testes keeps sperm production going?
   Testosterone.
4. Put these in order: germination, pollination, seed dispersal, fertilisation, seed formation.
   Pollination, fertilisation, seed formation, seed dispersal, germination.
5. Why can a mould appear on bread in a closed bag, even though nobody put it there?
   Mould spores are tiny and floating in the air everywhere, so some were already on the bread or in the bag and germinated.
6. Correct this statement: "A hormone works on every cell it reaches in the blood."
   A hormone travels everywhere in the blood but only changes the target cells that can respond to it.
7. Correct this statement: "A period is when the egg is released."
   The egg is released at ovulation, about halfway through the cycle; a period is the lining being shed when no fertilisation happened.
8. Correct this statement: "Pollination and fertilisation are the same thing."
   Pollination moves pollen to the stigma; fertilisation happens later, when the male gamete joins the egg inside the ovule.
9. Correct this statement: "Mushrooms grow from seeds."
   Fungi have no seeds; they grow from spores, which are single tiny cells.

Answer key (for parents and tutors)

1. In the chain kawakawa → looper caterpillar → tauhou (silvereye), which organism is the producer?
   Kawakawa, because it makes its own food by photosynthesis.
2. Name the role of the fungi growing on a fallen log.
   Decomposers, breaking the log down and returning nutrients to the soil.
3. A tapeworm lives in a dog's gut and takes its food. What type of relationship is this?
   Parasitism: the tapeworm gains and the dog is harmed.
4. In Room 15's transect, at what distance was marram grass cover highest?
   At 30 m, with 80% cover.
5. Why does an ecosystem need a constant supply of energy from the Sun but not a constant supply of new nutrients?
   Energy is lost as heat at every step, but nutrients are recycled by decomposers and used again.
6. Correct this statement: "In a food chain the arrow means 'eats', so it points from the ruru to the wētā."
   The arrow shows where energy goes, so it points from the food to the eater: wētā → ruru.
7. Correct this statement: "Decomposers are not important because they only deal with dead things."
   Decomposers return nutrients to the soil, and without them plants would run out of nutrients.
8. Correct this statement: "Energy is recycled round an ecosystem like nutrients are."
   Matter cycles, but energy flows one way and is lost as heat, so it must keep coming from the Sun.
9. Correct this statement: "Any relationship where two animals live together is mutualism."
   It is only mutualism if both benefit; if one is harmed, as with fleas on a dog, it is parasitism.