

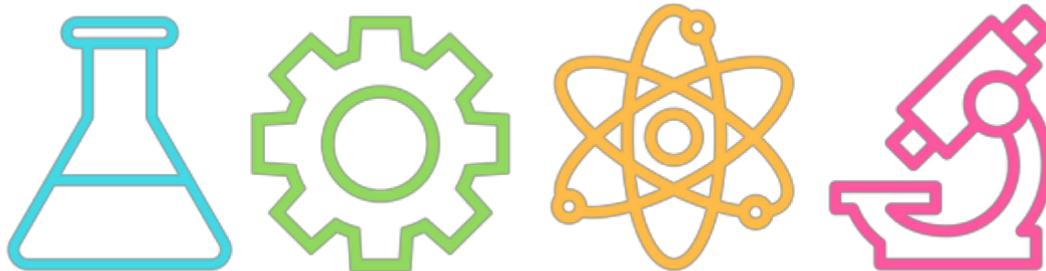
Year 9 – Exam Revision Question Booklet

Semester 2 Exam 2017

Ecosystems

Waves

Heat & Electricity



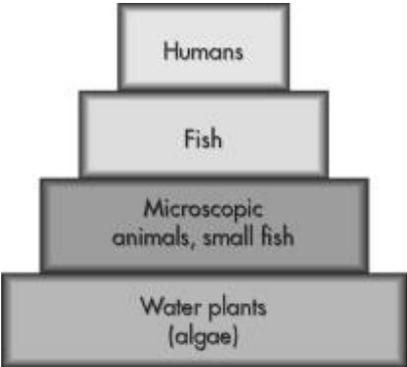
Ideas for revision:

- Concept maps
- Flash cards
- These worksheets
- Gamified and Science Quest textbook questions
 - Review past tests
 - Review notes
- Watch Youtube videos on topics covered

Food webs

Student: Class:

1. Examine the two graphics below and answer the questions that follow.



- (a) Identify the producers in the food chain.
- (b) In this food chain what type of consumer are the humans?
- (c) Explain why the food chain is represented as a pyramid.
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- (d) What is the ultimate source of energy for this food chain?
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Abiotic factors in an ecosystem

Student: Class:

The following table allows you to calculate the relative humidity (%) using readings from dry and wet bulb thermometers. Answer the questions below.

Relative humidity table (shown in %)										
Dry bulb	Difference between wet and dry bulb readings in degrees Celsius									
°C	1	2	3	4	5	6	7	8	9	10
10	88	77	66	55	44	34	24	15	6	
11	89	78	67	56	46	36	27	18	9	
12	89	78	68	58	48	39	29	21	12	
13	89	79	69	59	50	41	32	22	15	7
14	90	79	70	60	51	42	34	25	18	10
15	90	80	71	61	53	44	36	27	20	13
16	90	81	71	63	54	46	38	30	23	15
17	90	81	72	64	55	47	40	32	25	18
18	91	82	73	65	57	49	41	34	27	20
19	91	82	74	65	58	50	43	36	29	22
20	91	83	74	67	59	53	46	39	32	26
21	91	83	75	67	60	53	46	39	32	26
22	92	83	76	68	61	54	47	40	34	28
23	92	84	76	69	62	55	48	42	36	30
24	92	84	77	69	62	56	49	43	37	31
25	92	84	77	70	63	57	50	44	39	33

1. Use the data to calculate the relative humidity between two locations during a bush walk.

Location	Dry bulb temperature (°C)	Wet bulb temperature (°C)	Relative humidity (%)
Dry sclerophyll open forest on high ridge edge	25	19	
Wet sclerophyll gully community at bottom of the valley	23	20	

2. Explain why the relative humidity has changed as the walker descends from a ridge top into the valley.

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Ecosystems: Puzzles

Student: Class:

1. Work out the answer to each of the following. Check your answer in the Key list below. Use the Key list to discover a letter for the mystery word. Write this letter in the spaces below to determine the mystery word.
 1. Name the method used to measure population numbers in a given area.
 2. Air temperature is an example of what type of environmental factor?
 3. Competition is an example of what type of environmental factor?
 4. What is the source of energy for most ecosystems?
 5. What name is given to the conversion of glucose into energy?
 6. Name the animals that feed off plants.
 7. Name the organisms that break down dead remains.
 8. Name the process in which water is lost from plant leaves.
 9. What type of bacteria converts ammonia into nitrates?

Key list:

- | | | | |
|-------------------|----------------|-----------------|--------------------|
| T = transpiration | I = abiotic | N = nitrogen | G = geothermal |
| R = recapture | V = biotic | D = quadrat | S = herbivores |
| O = osmosis | E = sun | I = decomposers | P = photosynthesis |
| C = consumer | Y = nitrifying | R = respiration | O = oxygen |

Mystery word:

1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---

2. Each set contains letter sequences of three words about Ecology. Unscramble the letter sequences to discover the three words:

DE CLE TEM OD CY OS RA BI RE YS EC EG

Answer:

3. In the grid are two words related to the topic Ecology. The letters of each word follow sequentially as you move around the grid. Identify the words.

A	L	L
R	C	O
E	O	R
F	N	T

Words:

Individual pathways

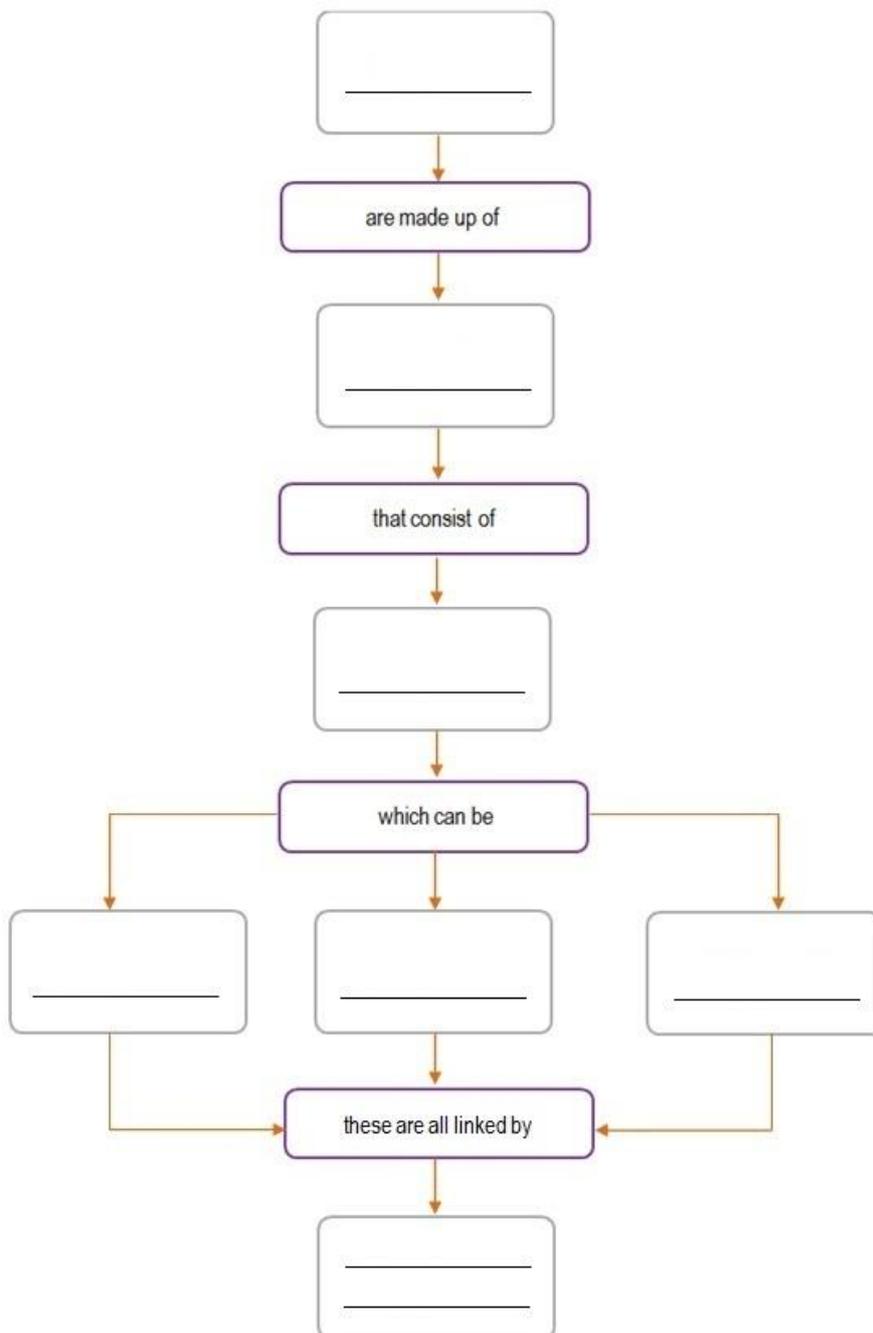
Activity 5.2

Investigating ecosystems

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1. Use the words below to complete the flowchart describing relationships within ecosystems.

Decomposers	Communities	Feeding relationships	Producers
Consumers	Ecosystems	Populations	



Activity 5.2

2. Define parasitism, mutualism and commensalism, and give an example of each.

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3. A group of science students were investigating the impact of low tide on the distribution of grey periwinkles along a rocky shore. Periwinkles are a type of aquatic mollusc commonly found in the intertidal zone and are well adapted to the changing conditions between low and high tides (e.g. access to water, wind and sun exposure, oxygen levels, salinity).

- (a) List three relevant abiotic factors that could be measured.

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- (b) Describe which instrumentation or method would be used for each of the factors listed for the question above.

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To estimate the size of the periwinkle population that inhabits the rocky shore during low tide, students decided to use the capture-recapture method.

- (c) Explain how this method works.

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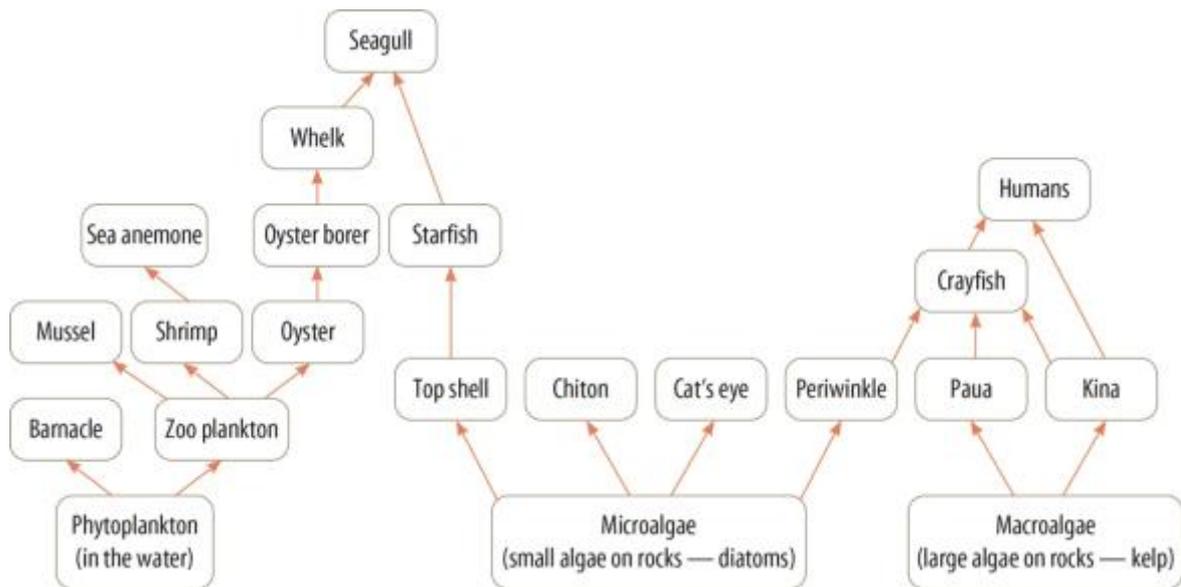
The students decided to use nail polish to mark the shells of periwinkles that were exposed at low tide on the first day. A total of 100 periwinkles were tagged in this way. During the first low tide on the next day, the students revisited the shoreline and counted 300 periwinkles. Of this sample, a total of 50 were marked.

- (d) Using the following equation (where A is the number of individuals tagged initially, B is the total number of individuals counted in the second sample and C is the number of tagged individuals in the second sample), estimate the number of periwinkles.

$$\text{Estimated population} = \frac{A \times B}{C}$$

Activity 5.2

After studying the interactions along the rocky shoreline, students created the following food web.



(e) Using this web, draw two food chains. Make sure you label the producer and the primary, secondary and tertiary consumers.

(f) Identify the predator and prey of the crayfish.

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4.

(a) Name and describe the process that produces oxygen and sugar within plants.

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Activity 5.2

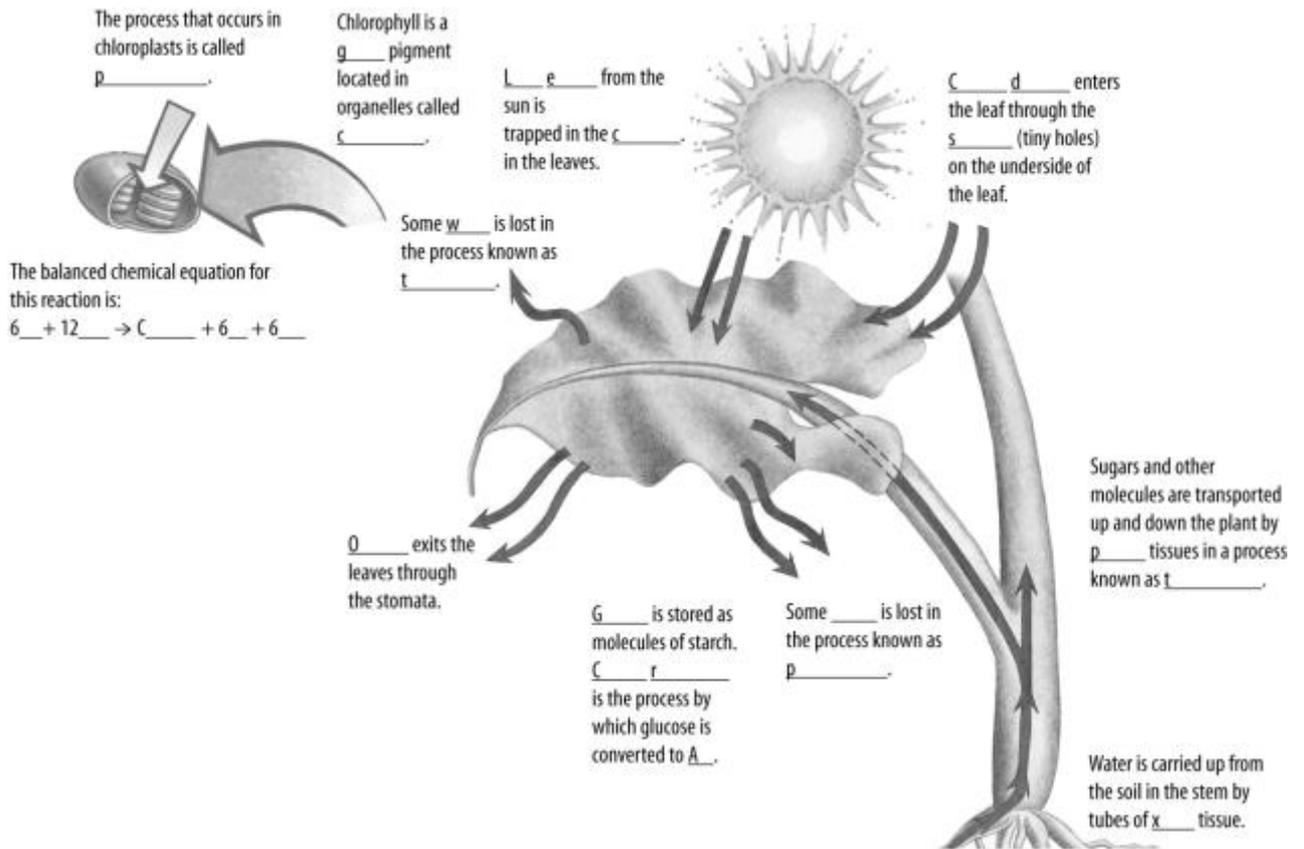
(b) Explain how oxygen and sugar are utilised in animals, and name this process.

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(c) Write the word and chemical equations for the processes described in parts (a) and (b) above.

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5. Fill in the missing information on the following diagram.



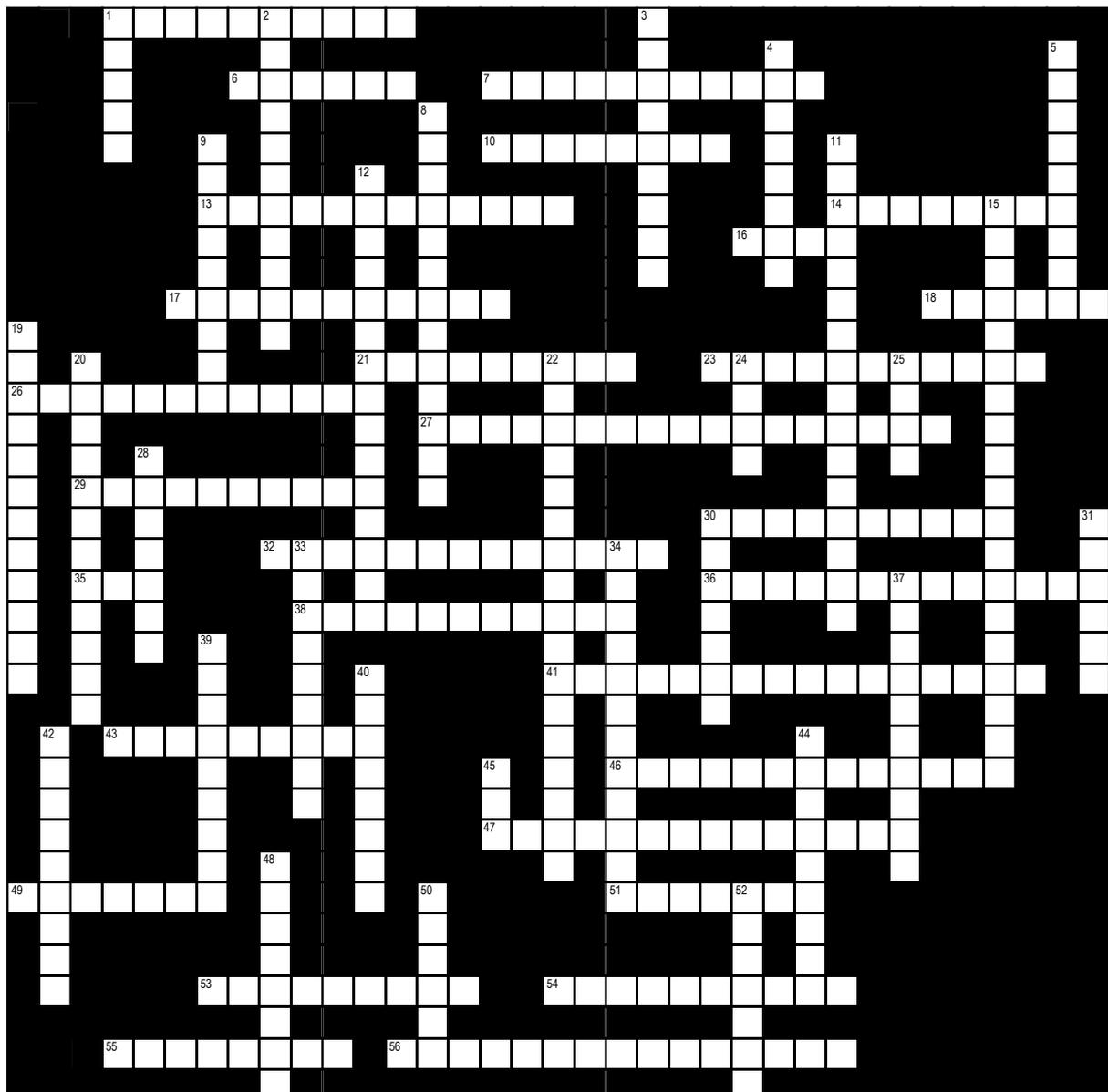
6. Fill in the table below comparing anaerobic and aerobic respiration. Refer to the 'Features of aerobic and anaerobic respiration' table in section 5.5 of the textbook for further information.

	Aerobic Respiration	Anaerobic Respiration
Requires oxygen		
Number of ATP produced		
Speed of ATP production		
End products of reaction		

Activity 5.2

11. Revise the key terms in this chapter by completing the following crossword using the provided list of words in the box below and the clues on the following pages.

ABA	abiotic	abundance	aerobic	anaerobic	ATP	autotroph
biological control		chemical control		biomass	biotic	birth rate
capture-recapture		carnivore	carrying capacity		cellular respiration	
chlorophyll	chloroplast	commensalism	competition	consumer	decomposer	
death rate	ecological niche	emigration	glucose	herbivore	heterotroph	
hormones	host	immigration	interactions	interspecific	intraspecific	
introduced species	mitochondria	mutualism	nocturnal		optimum range	
parasite	parasitism	pest	phloem	photosynthesis	predator	prey
producer	quadrant	starch	stomata	symbiotic		tolerance
translocation	transpiration	trophic level	vector	xerophytes		xylem



ACROSS

- 1 Plants adapted to survive in deserts and other dry habitats (10)
- 6 Glucose in plants is stored as this (6)
- 7 The act of individuals moving into a population or ecosystem (11)
- 10 An organism that lives within or on a host (8)
- 13 Commonly referred to as the 'power house' of the cell (12)
- 14 An organism that makes its own food using energy from an outside source such as the sun (8)
- 16 An organism that competes for resources or potentially lowers the yield of a plant crop (4)
- 17 Occurs when two or more organisms from the same or different species need to utilise the same resources (11)
- 18 Network of tubes through which sugars produced in photosynthesis are transported up and down the plant (6)
- 21 Type of respiration that results in the production of lactic acid in animals (9)
- 23 The pigment in plants and algae that absorbs light for use in photosynthesis (11)
- 26 Another name for a feeding level in an ecosystem (7,5)
- 27 A species that has been released into an ecosystem where it does not naturally occur (10,7)
- 29 The term used to describe the departure of individuals from a population or ecosystem (10)
- 30 Organisms that make their own food (e.g. plants, phytoplankton and certain bacteria) (10)
- 32 Competition for resources between members of the same species (13)
- 35 Abbreviation for the plant hormone that induces stomatal closure (3)
- 36 Competition between members of different species for the same resources (13)
- 38 The structure within plant cells that contains chlorophyll (11)

DOWN

- 1 The tubes involved in transporting water and minerals from the roots upwards through the stem of a plant (5)
- 2 The term given to an organism that obtains its energy from feeding on other organisms (11)
- 3 Eats plants and can be described as a primary consumer (9)
- 4 An organism that relies entirely on other organisms for its food (8)
- 5 The rate at which organisms die within a population (5,4)
- 8 The process by which water is transported up from the roots of the plant, through the xylem and out through stomata (13)
- 9 Interdependent relationships between species in an ecosystem (9)
- 11 The sampling method used to determine the abundance of mobile species (7-9)
- 12 The use of herbicides, fungicides and insecticides to control a pest species (8,7)
- 15 The chemical reaction that breaks down glucose in the presence of oxygen to produce ATP (8,11)
- 19 The range in which an organism functions best with regards to abiotic factors (7,5)
- 20 An interaction between two organisms where only one of them benefits but the host is not affected (12)
- 22 The use of natural feeding relationships to control a pest species (10,7)
- 24 An organism that sustains another organism either with or without harm (4)
- 25 The term used to describe a hopping mouse that a dingo will hunt, kill and consume (4)
- 28 The name given to matter made up of living or dead organisms or parts of them (7)
- 30 Type of factor; non-living things that affect the ecosystem (e.g. sunlight, wind, rain and soil) (7)
- 31 An organism that carries pollen or disease from one organism to another (6)
- 33 Animals that are only active at night (9)

ACROSS

- 41** The state reached when the population contains the maximum number of individuals that its particular environment can carry (8,8)
- 43** Another term for the number of organisms of a particular species within a measured area (9)
- 46** The process by which organic substances are transported up and down the plant via phloem (13)
- 47** The chemical reaction that occurs within the chloroplasts of plants (14)
- 49** The sugar made during photosynthesis and utilised in cellular respiration (7)
- 51** Tiny pores in leaves; the site of gas and water exchange in plants (7)
- 53** The rate at which organisms are born within a population. (5,4)
- 54** An organism that breaks down the matter of dead organisms so they can be returned to the soil, air and water (e.g. bacteria and fungi) (10)
- 55** The chemical messengers plants rely on because they don't have a nervous system (8)
- 56** The place where a species finds habitat, obtains its food and interacts with other species within the ecosystem (10,5)

DOWN

- 34** The term given to the balanced way organisms react with each other and their environment within an ecosystem (12)
- 37** The type of interaction where one species lives on or in a host and potentially causes it harm (10)
- 39** An animal that only eats meat (9)
- 40** An animal that catches and eats other animals (8)
- 42** A symbiotic relationship where both of the organisms involved benefit and neither is harmed (9)
- 44** The limit a species has for each abiotic factor (9)
- 45** Abbreviation for the chemical adenosine triphosphate, made by cells for the storage of the energy released during respiration (3)
- 48** A square of a known size in which a population sample is conducted (8)
- 50** Type of factor; plants, ground cover, animals and humans that affect the ecosystem (6)
- 52** Type of respiration that occurs in the presence of oxygen (7)

Ecosystems: Summary

Student: Class:

Use the listed words to complete the sentences.

capture	consumers	energy	first	food
fungi	glucose	interbreed	matter	plastics
quadrat	recaptured	species	trophic	water

1. If there are many organisms or the area is large, the method may be used to estimate the population of a specific organism.
2. The capture–recapture method is used to estimate populations of animals. Some animals are captured and tagged, then released back into the environment. At a later stage the researchers return to the field and more animals. By working out what proportion of the animals are tagged, they can estimate the total number of animals.
3. Organisms that belong to the same species can to produce fertile offspring. Animals may look quite similar yet belong to different
4. The source of in all ecosystems (except those that use geothermal energy) is sunlight. The light from the sun is converted to plant matter as plants carry out photosynthesis. Animals eat the plant matter and they take in the energy stored in plants. Bacteria and obtain their energy from the breakdown of other organisms.
5. In the process of photosynthesis carbon dioxide and water combine to form and oxygen. In cellular respiration, sugars such as glucose react with oxygen to form carbon dioxide and
6. The flow of energy through ecosystems can be represented in a web. The arrows in the food web show the direction in which the energy is transferred.
7. In a food web the plants or producers make up the first level (feeding level). The animals that eat plants make up the next trophic level. They are called herbivores or first order consumers.
8. A large mass of producers is needed to support a small number of top level This can be shown using a biomass pyramid.
9. Whilst energy flows through ecosystems is recycled. The water, carbon, nitrogen and phosphorus cycles ensure that matter is recycled.
10. Many materials can be recycled or composted rather than ending up in landfill. Glass, aluminium and other metals, paper and many can be made into new objects rather than be dumped at the tip.

Jacaranda Science Quest 9: Topic 5 test 3

Name: _____

1	<p>Which of the following are the key products of cellular respiration?</p> <p>A Glucose and oxygen B Glucose and water C Carbon dioxide and oxygen D Carbon dioxide and water</p>		1
2	<p>In which part of a living cell does respiration take place?</p> <p>A Mitochondria B Nucleus C Cell wall D Vacuole E Chloroplasts F All of the above G None of the above</p>		1
3	<p>The process of fermentation is an example of:</p> <p>A aerobic respiration. B anaerobic respiration. C photosynthesis. D transpiration.</p>		1
4	<p>The gas produced by fermentation in yeast cells is:</p> <p>A carbon dioxide. B hydrogen. C oxygen. D nitrogen.</p>		1
5	<p>Anaerobic respiration is respiration without:</p> <p>A enzymes. B glucose. C oxygen. D all of the above. E none of the above.</p>		1
6	<p>When anaerobic respiration takes place in the muscle cells, glucose stored in the cells is converted to:</p> <p>A enzymes. B lactic acid. C protein. D starch.</p>		1

Topic 5 test 3

7	The process used by plants to convert energy from the sun into chemical energy is: A diffusion. B respiration. C photosynthesis. D transpiration.		1
8	In which parts of plant cells does photosynthesis take place? A Mitochondria B Nucleus C Cell wall D Vacuole E Chloroplasts F All of the above G None of the above		1
9	The glucose produced by plants can be converted for later use into larger molecules of one or more of: A cellulose. B protein. C starch. D water.		1
10	When glucose is converted into other chemicals for later use it is stored in: A leaves. B stems. C roots. D all of the above. E none of the above.		1
11	As it is transferred along a food chain, the total amount of chemical energy available to organisms: A remains constant. B increases. C decreases.		1
12	Organisms that consume parts of the bodies of other organisms that are left on the ground are called: A bacteria. B consumers. C producers. D scavengers.		1

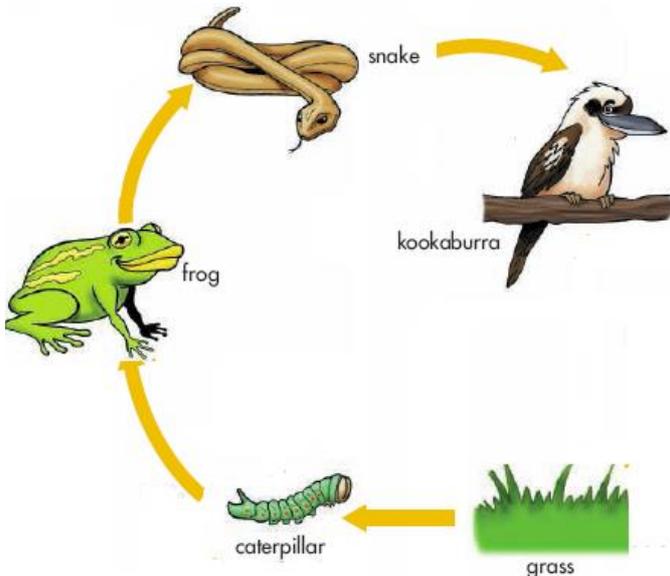
Topic 5 test 3

13	The breakdown of the remains of dead organisms on and below the Earth's surface is largely the responsibility of: A consumers. B decomposers. C producers. D scavengers.		1
14	Plants return water from the soil to the atmosphere in the process of: A respiration. B photosynthesis. C transpiration. D decomposition.		1
15	Identify an abiotic component of the natural environment. A Competitors B Wind speed C Predators D Plants		1
16	Identify a biotic component of the natural environment A Shelter B Humidity C Salinity D pH		1
17	The population of wombats was determined in an area. On the first visit, 42 wombats were captured and tagged. On the second visit, the number of tagged wombats that were recaptured was 60 per cent. The population of wombats in this area was: A 42. B 60. C 70. D 252.		1

Topic 5 test 3

<p>18</p>	<p>The quadrat method was used to determine the average density of palms in a bushland area. The formula used to calculate the average density was:</p> $\text{Estimated average density} = \frac{\text{Total no. of individuals counted}}{\text{No. of quadrats} \times \text{area of each quadrat}}$ <p>Five quadrats were sampled. Each quadrat was 5 m². A total of 75 palm trees were counted. The average density of palms was:</p> <p>A 75. B 25. C 3. D 85.</p>		<p>1</p>
<p>19</p>	<p>A large number of different plant and animal species in a woodland community is called:</p> <p>A genetic biodiversity. B species biodiversity. C ecological biodiversity. D sexual biodiversity.</p>		<p>1</p>
<p>20</p>	<p>An alternative name for a producer in a food web is:</p> <p>A autotroph. B heterotrophy. C consumer. D decomposer.</p>		<p>1</p>
<p>21</p>	<p>A common method used to separate the pigments in a plant leaf is:</p> <p>A filtration. B distillation. C chromatography. D evaporation.</p>		<p>1</p>
<p>22</p>	<p>The organisms in a food chain are (in random order) grasshopper, eagle, grass and lizard. The organism that is at the second trophic level is the:</p> <p>A grasshopper. B eagle. C grass. D lizard.</p>		<p>1</p>

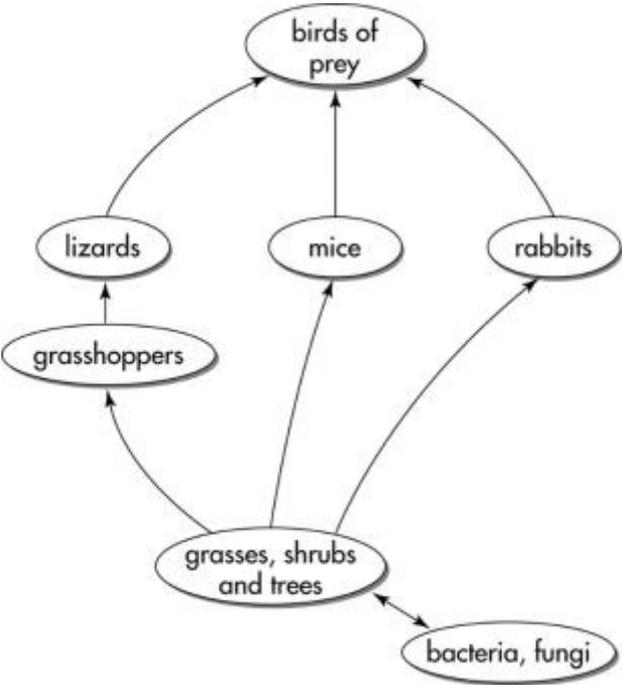
Topic 5 test 3

<p>23</p>	<p>Consider the following food chain.</p>  <p>The second-order consumer in this food chain is the:</p> <p>A caterpillar. B frog. C snake. D kookaburra.</p>		<p>1</p>
<p>24</p>	<p>Commensalism is:</p> <p>A the attachment of one plant to another. B parasitism in plants. C the interaction in which one species benefits from another without affecting the host. D interaction between two animal species without harm to either.</p>		<p>1</p>
<p>25</p>	<p>An example of a saprophyte (organism that lives on dead and decaying plants) is:</p> <p>A a fern. B a fungus. C mistletoe. D an orchid.</p>		<p>1</p>
<p>26</p>	<p>To test the effect of shade on plant growth, a student uses two plants of the same size. Which of the following sets of conditions would be best?</p> <p>A One small pot; one large pot; equal amounts of water; in the same position under shade B Both small pots; equal amounts of water; one in shade one in the sun C Both large pots, different amounts of water, one in shade, one in the sun D One small pot, one large pot, different amounts of water, one in shade, one in the sun</p>		<p>1</p>

Topic 5 test 3

27	<p>Nitrogen compounds are important for plant growth. These are obtained:</p> <p>A by absorption of nitrogen from the air through the leaves.</p> <p>B from nitrogen minerals in the soil.</p> <p>C from the activity of bacteria in the stems and roots.</p> <p>D from fertilisers alone.</p>		1
28	<p>Xylem tissue:</p> <p>A carries water and dissolved minerals from the soil throughout the plant.</p> <p>B transports soluble food made in the leaves by photosynthesis.</p> <p>C acts as a region for starch storage.</p> <p>D manufactures glucose.</p>		1
29	<p>Phloem tissue:</p> <p>A is involved in the transpiration stream.</p> <p>B assists in excretion of wastes from the plant.</p> <p>C translocates sugars throughout the plant.</p> <p>D produces sugar via photosynthesis.</p>		1
30	<p>Why is fire necessary for the regeneration of some plants?</p>		2
31	<p>State two benefits of fire in the Australian bush.</p>		2
32	<p>Identify two effects that drought has on the environment.</p>		2
33	<p>Name the interaction described in each case:</p> <p>a) Interaction between two organisms where one obtains food from the host</p> <p>b) Interaction between species in which one benefits, without affecting the host</p> <p>c) Interaction that benefits both organisms</p>		3
34	<p>Without fire, what would happen to our open woodland system?</p>		3
35	<p>What is the major difference between aerobic respiration and anaerobic respiration?</p>		2

Topic 5 test 3

36	Why is respiration sometimes described as a type of burning?		2
37	What does an energy pyramid show?		1
38	<p>The diagram below shows a small part of a forest food web. Which of the organisms in the food web are:</p> <p>(a) first-order consumers (b) third-order consumers (c) producers (d) decomposers?</p> 		4
39	<p>There is a lot of community concern about the introduction of animals and plants, either deliberately or accidentally, to Australia from other countries. How could the introduction of a second-order consumer from another ecosystem change the energy flow through a food web?</p>		2
40	<p>Cane toads were introduced into Australia in 1935.</p> <p>(a) Why were they introduced? (b) Why have they become a pest?</p>		2

Topic 5 test 3

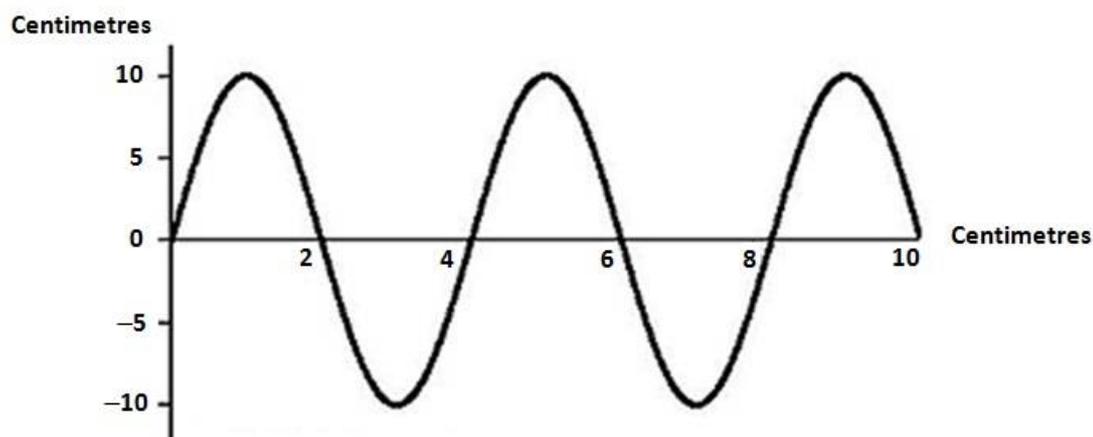
41	Explain why there are no chloroplasts in root cells.		2																								
42	Polly investigated experimentally the effect of plant shoots growing towards light of different wavelengths. (a) Identify the independent variable. (b) Identify the dependent variable. (c) Name some variables that need to be controlled.		3																								
43	Write a <u>balanced</u> equation for photosynthesis.		3																								
44	(a) Explain the role of decomposers. (b) Identify some common decomposers in soil.		2																								
45	<p>The population of bilbies in a rural area was investigated using the capture-recapture method. 40 bilbies were captured and tagged. On five return visits, the percentage of tagged bilbies recaptured was determined. The results are shown below.</p> <table border="1" data-bbox="236 1059 836 1312"> <thead> <tr> <th>Visit</th> <th>Total number of bilbies captured</th> <th>Number of tagged bilbies captured</th> <th>% of bilbies tagged</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>25</td> <td>6</td> <td></td> </tr> <tr> <td>2</td> <td>30</td> <td>9</td> <td></td> </tr> <tr> <td>3</td> <td>33</td> <td>7</td> <td></td> </tr> <tr> <td>4</td> <td>34</td> <td>11</td> <td></td> </tr> <tr> <td>5</td> <td>15</td> <td>5</td> <td></td> </tr> </tbody> </table> <p>(a) Complete column 4 (percentage of bilbies tagged). (b) Estimate the population of bilbies in this area.</p>	Visit	Total number of bilbies captured	Number of tagged bilbies captured	% of bilbies tagged	1	25	6		2	30	9		3	33	7		4	34	11		5	15	5			7
Visit	Total number of bilbies captured	Number of tagged bilbies captured	% of bilbies tagged																								
1	25	6																									
2	30	9																									
3	33	7																									
4	34	11																									
5	15	5																									
46	The day after an aerobics class, Tam’s muscles felt really sore. Her friend Thuy told her that the pain was due to the lactic acid from the exercise burning the muscles. Is Thuy correct? Explain your answer.		3																								

Individual Pathways Activity 9.2

Answers

Investigating energy transmission

1.



- (a) What type of wave is shown in the diagram above?
- (b) What is the wave's:
- (i) wavelength
- (ii) amplitude?
- (c) Give an example of energy that travels in this type of wave.

2. Generally, the speed of sound through a material depends upon how close together the particles of that material are and how elastic it is. The greater the ease with which collisions between particles (which transfer kinetic energy) can occur, the faster a sound wave can travel through the material. The following table gives you the speed at which sound waves travel through a variety of materials.

Activity 9.2 answers

Material	Speed of sound (m/s)
Air (0 °C)	331
Air (20 °C)	344
Water (pure)	1498
Sea water	1540
Alcohol	1207
Blood (37 °C)	1570
Body tissue (37 °C)	1570
Aluminium	5100
Copper	3900
Concrete	4500
Granite	5000
Lead	1960
Glass (Pyrex)	5170
Iron	5120
Steel	4700–6000 (average 5400)
Wood	4000–5300

- (a) Looking at the values in this table, what generalisation can you make about the speed of sound in liquids compared to its speed in solids and in gases?

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- (b) The wavelength (in metres) of a sound wave as it moves through any material depends upon its frequency (in hertz) and its speed in that material. This relationship can be represented by the equation $(\text{wavelength}) = (\text{speed}) \div (\text{frequency})$. Use this equation to calculate the wavelength of a sound wave that has a frequency of 150 Hz as it passes through copper.

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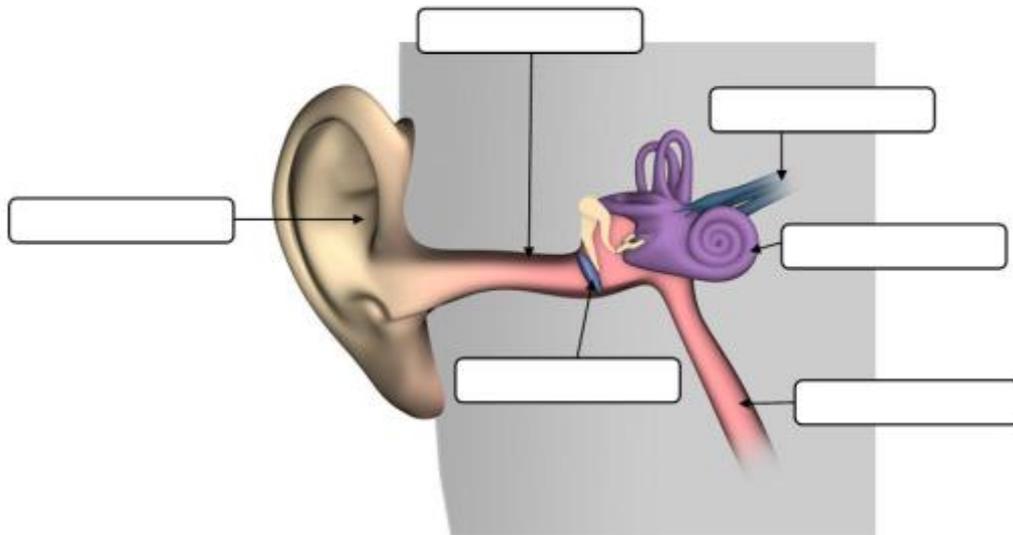
- (c) In movies you may see someone trying to tell if a train is coming by pressing their ear against the steel rail of the train track. Explain why this would be any better than just trying to hear the sound of the train coming through the air.

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Activity 9.2 answers

3. Insert the following words into the diagram of the auditory system below.

Cochlea	Eustachian tube	Ear drum
Auricle	Auditory nerve	Ear canal



4. Complete the table below by placing one of the types of electromagnetic waves next to its description:

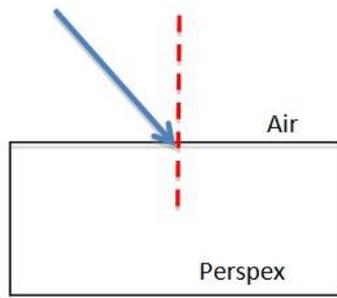
Visible light	Radio waves	X-rays	Ultraviolet radiation
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Type of electromagnetic wave	Description
	Invisible to the human eye. The body needs it to form vitamin D but too much can give you a sunburn.
	Used to form images that show what's under your skin. It can also be used to kill cancer cells and detect flaws in metal components.
	Necessary for our sense of sight and for plants to perform photosynthesis. It is only a very small section of the electromagnetic spectrum.
	These are low-energy waves used to communicate over long distances. They include radar and microwaves.

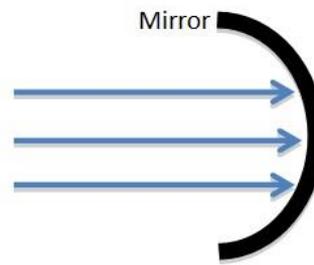
Activity 9.2 answers

5. For each of the diagrams below, draw the path of the light beams that would result.

(a)



(b)



6. Explain why people who have normal vision for much of their life may need glasses as they grow older.

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7. At the moment, we are in the process of changing over from analogue TV signals to digital TV signals. Give at least **two** advantages that digital TV will have over analogue TV.

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8. Explain how visible light is used to transmit phone calls along optical fibres. You may use diagrams to help you in your explanation if you wish.

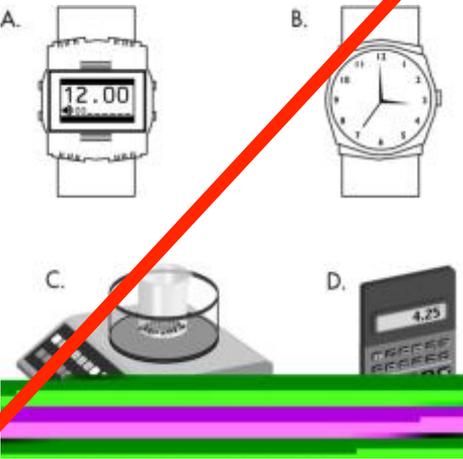
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Jacaranda Science Quest 9: Topic 9 test 3

Name: _____

1.	<p>Identify the correct statement about reflection of light.</p> <ol style="list-style-type: none"> 1. The angle of incidence equals the angle of refraction. 2. The reflective coating is commonly placed on the back surface of a plane mirror. 3. The law of reflection only applies to plane mirrors. 4. Parallel rays of light are reflected to a focal point in a convex mirror. 		1
5.	<p>Which material can be classified as translucent?</p> <p>A Red cardboard</p> <p>B Window glass</p> <p>C Frosted glass</p> <p>D Carpet</p>		1
6.	<p>Which of the following is not an example of electromagnetic radiation?</p> <ol style="list-style-type: none"> 1. Light 2. Microwaves 3. Sound 4. Ultraviolet radiation 5. X-rays 		1

6.	Which statement applies to all waves? 1. Can move through a vacuum 2. Carry energy 3. Involve electric and magnetic fields 4. Travel faster in solids		1
5.	Through which of the following materials does light travel with the greatest speed? 1. Water 2. Glass 3. Air 4. Diamond		1
5.	The waves of the electromagnetic spectrum with the shortest wavelength are: 1. radio. 2. infra-red. 3. X-rays. 4. gamma.		1
5.	The coloured part of the eye is the: 1. iris. 2. cornea. 3. retina. 4. sclera.		1

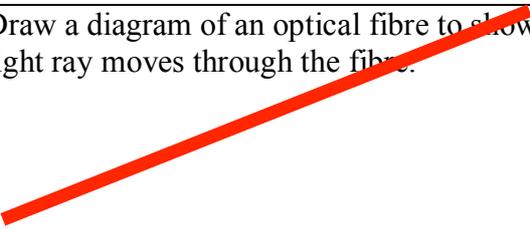
<p>5.</p>	<p>Which of the following types of waves are examples of radio waves?</p> <ol style="list-style-type: none"> 1. Infra-red radiation 2. Microwaves 3. Sound waves 4. Ultraviolet radiation 		<p>1</p>
<p>5.</p>	<p>Which of the following methods of long-distance communication cannot be used without artificially produced electromagnetic radiation?</p> <ol style="list-style-type: none"> 1. Co-axial cable 2. Mail 3. Optical fibres 4. Telegraph 		<p>1</p>
<p>5.</p>	<p>Which of the following is a not a digital device?</p> <div style="text-align: center;">  <p>A.  B. </p> <p>C.  D. </p> </div>		<p>1</p>

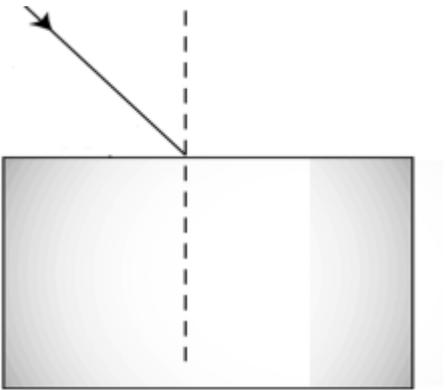
6.	<p>A surface that absorbs light is said to be:</p> <ol style="list-style-type: none"> 1. opaque. 2. transparent. 3. optically dense. 4. translucent. 		1
5.	<p>The speed of radio waves in air is closest to:</p> <ol style="list-style-type: none"> 1. 100 m/s. 2. 186 000 m/s. 3. 300 m/s. 4. 300 km/h. 5. 300 000 000 m/s. 		1
6.	<p>Which of the following measures the wavelength of a transverse wave?</p> <ol style="list-style-type: none"> 1. The distance between the top of a crest and bottom of a trough 2. The distance of the top of a crest above the bottom of a trough 3. The distance from the start of a wave to its end 4. The distance between the bottoms of two troughs 		1
5.	<p>Optical fibres are used in communication systems to carry:</p> <ol style="list-style-type: none"> 1. high frequency light pulses 2. electrical signals. 3. AC current 4. microwaves and sound waves. 		1

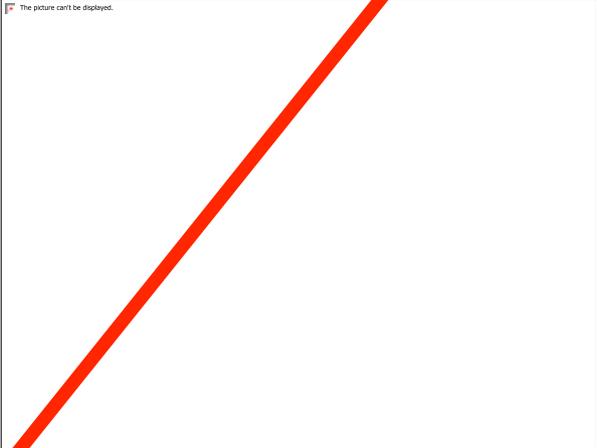
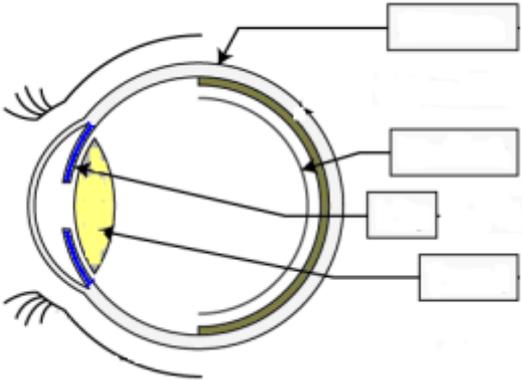
<p>5.</p>	<p>Light pulses can be sent long distance along glass fibres without leaving the glass as a result of:</p> <ol style="list-style-type: none"> 1. the transparency of glass. 2. the high speed of light. 3. total internal reflection. 4. the absorption of light. 		<p>1</p>
<p>5.</p>	<p>Which of the following shows different types of waves in order of increasing frequency?</p> <ol style="list-style-type: none"> 1. AM radio, FM radio, infra-red radiation, visible light, ultraviolet radiation, X-rays 2. Visible light, AM radio, FM radio, infra-red radiation, X-rays, ultraviolet radiation 3. Microwaves, X-rays, FM radio, AM radio, ultraviolet radiation, infra-red radiation 4. Gamma rays, X-rays, ultraviolet radiation, visible light, infra-red radiation, FM radio 		<p>1</p>
<p>5.</p>	<p>Television signals are transmitted on:</p> <ol style="list-style-type: none"> 1. AM radio waves. 2. FM radio waves. 3. both AM and FM radio waves. 4. neither AM nor FM radio waves. 		<p>1</p>
<p>5.</p>	<p>The most optically dense natural material is:</p> <ol style="list-style-type: none"> 1. diamond. 2. quartz. 3. glass. 4. emerald. 		<p>1</p>

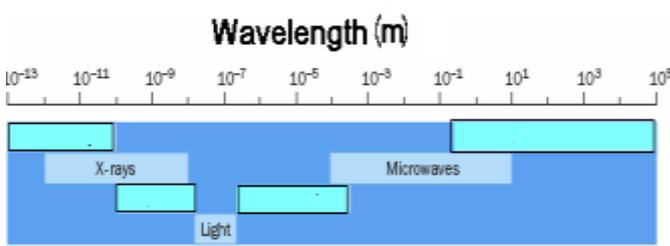
5.	<p>Which of the following methods of communication can carry the biggest number of two-way conversations at once?</p> <ol style="list-style-type: none"> 1. Copper cable 2. Coaxial cable 3. The microwave link 4. Optical fibres 		1
5.	<p>Which of the following long distance communication methods use repeater stations? (More than one answer.)</p> <ol style="list-style-type: none"> 1. The microwave link 2. Coaxial cables 3. Optical fibres 4. Earth-satellite radio waves 		1
5.	<p>In which part of a synchrotron are electrons accelerated to 99.9987% of the speed of light by a high voltage electric field?</p> <ol style="list-style-type: none"> 1. Storage ring 2. Booster ring 3. Linac 4. Beamline 		1
5.	<p>Why is it not possible for sound to travel through the vacuum of outer space?</p>		2

6.	Use a diagram to show the difference between a compression and a rarefaction.	2
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<p>7.</p>	<p>Parallel rays of light are incident on a convex and a concave mirror. Draw diagrams to show the paths of the reflected rays.</p>		<p>2</p>
<p>8.</p>	<p>Draw a diagram of an optical fibre to show how a light ray moves through the fibre.</p> 		<p>2</p>

<p>9.</p>	<p>Copy and complete the following diagram to show the refraction of the light ray.</p> 	<p>2</p>
<p>10.</p>	<p>List one use of each of the following types of waves.</p> <ol style="list-style-type: none"> 1. Microwaves 2. Infra-red radiation 3. X-rays 4. Gamma rays 	<p>4</p>

<p>5.</p>	<p>White light is composed of a spectrum of colours. White light strikes a green box as shown. Complete the diagram to show the reflected light.</p> 	<p>2</p>
<p>6.</p>	<p>Are electromagnetic waves transverse waves or compression waves? State a reason for your answer.</p>	<p>2</p>
<p>7.</p>	<p>Complete the labelling of the eye diagram.</p> 	<p>4</p>
<p>8.</p>	<p>A radio wave has a speed of 300 000 000 m/s and a wavelength of 10 m. Calculate the frequency of the radio wave in MegaHertz (MHz).</p>	<p>2</p>

<p>9.</p>	<p>Complete the diagram of the electromagnetic spectrum by naming the remaining bands.</p>  <p style="text-align: center;">Wavelength (m)</p> <p style="text-align: center;">Electromagnetic Spectrum</p>	<p>4</p>
<p>33</p>	<p>When you place a metal saucepan on the heating element of a stove, heat is transferred from the element to the saucepan by:</p> <ol style="list-style-type: none"> 1. reflection. 2. convection. 3. conduction. 4. radiation. 	<p>1</p>
<p>34</p>	<p>Which two types of heat transfer listed below are reduced by placing fibreglass batts in the ceiling of a house?</p> <ol style="list-style-type: none"> 1. Conduction 2. Convection 3. Radiation 	<p>2</p>

35	<p>When you are active in cool weather, heat is transferred from your body by:</p> <ol style="list-style-type: none"> 1. radiation. 2. convection. 3. conduction. 4. evaporation. 5. all of the above. 		1
36	<p>Which of the following factors influence the variation of climate over the Earth's surface?</p> <p>A. The amount of solar energy reaching the surface.</p> <p>B. The different abilities of land and water to absorb and radiate heat.</p> <p>C. The tilt of the Earth's axis.</p> <p>D. Features such as mountains and sandy deserts.</p> <p>E. All of the above</p>		1
37	<p>(a) Identify the group of materials that are good heat conductors.</p> <p>(b) What name is given to materials that are poor heat conductors?</p>		2
38	<p>List three places where heat is lost from a home during winter. State how heat is transferred at each place and how heat loss may be reduced.</p>		6

39	What three things can happen to radiated heat when it reaches an object?	3
40	Explain how convection heaters work.	4
41	Describe an experiment to show that steel conducts heat faster than glass.	4

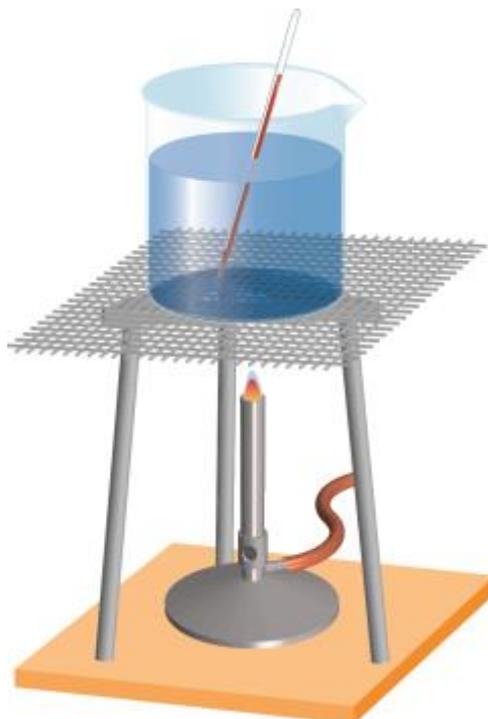
Individual pathways

Activity 10.2

Investigating heat and electricity

doc-19262

1. The image below shows a beaker of water on a tripod being heated over a Bunsen burner. A thermometer is being used to monitor the water's temperature.



(a) Identify by which transfer method (radiation, conduction, or convection) heat is:

- (i) transferred from the Bunsen burner to the bottom of the beaker

.....

- (ii) transferred from the bottom of the beaker to the thermometer bulb

.....

- (iii) spread through the water.

.....

(b) Describe two ways in which you could increase the rate at which the water is heated.

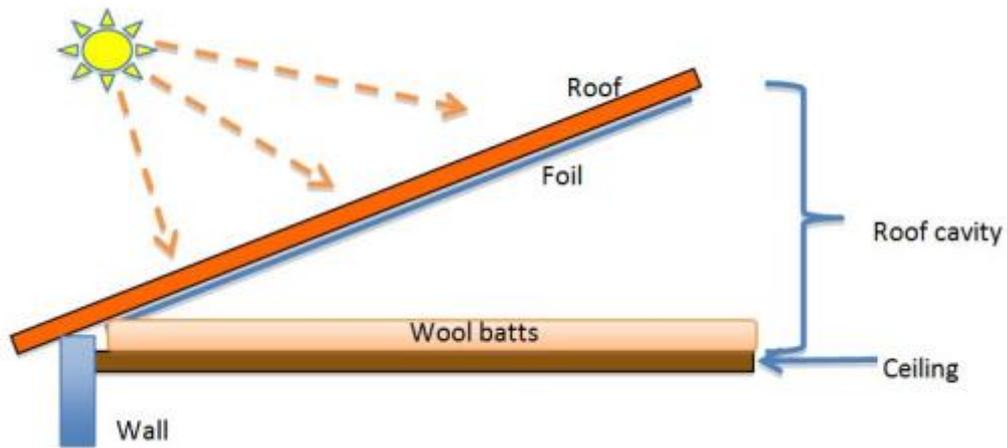
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Activity 10.2

2. Thermals are streams of rising air that are formed on the ground through the warming of a surface by sunlight. Explain why thermals are commonly formed above bitumen roads and freshly-tilled fields.

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3. In Australia, many houses have insulation in their roofs to keep the rooms below cooler in summer. One method is to use a shiny metal foil to line the inside of the roof; another is to use thick wool pads or batts to completely cover the floor of the roof cavity.



Explain how each of the two following methods of insulation works to keep a house cooler.

- (a) Wool batts:

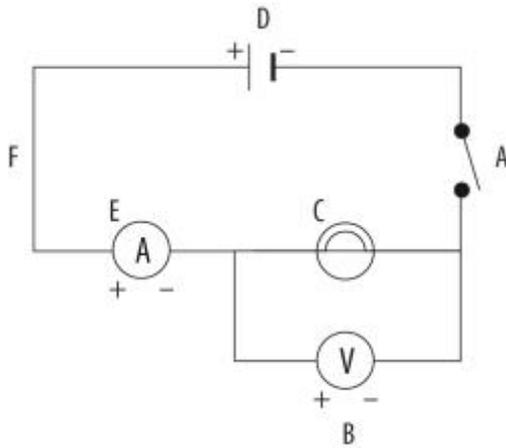
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- (b) Insulating metal foil:

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Activity 10.2

4. Identify each of the components labelled A–F in the diagram below.



- A:
- B:
- C:
- D:
- E:
- F:

5. A circuit is built that is made up of a 9-volt battery and three identical bulbs connected in series.

- (a) Draw a diagram of the circuit.

- (b) How many connecting wires would you need to use in this circuit?
- (c) Explain how you would add a voltmeter to this circuit in order to measure the voltage drop across one of the bulbs.

- (d) Approximately what voltage drop would you expect to occur over each bulb?

- (e) The circuit is now pulled apart and the bulbs are connected in parallel with the 9-volt battery. What will be the voltage drop across each bulb now? Explain your answer.

Activity 10.2

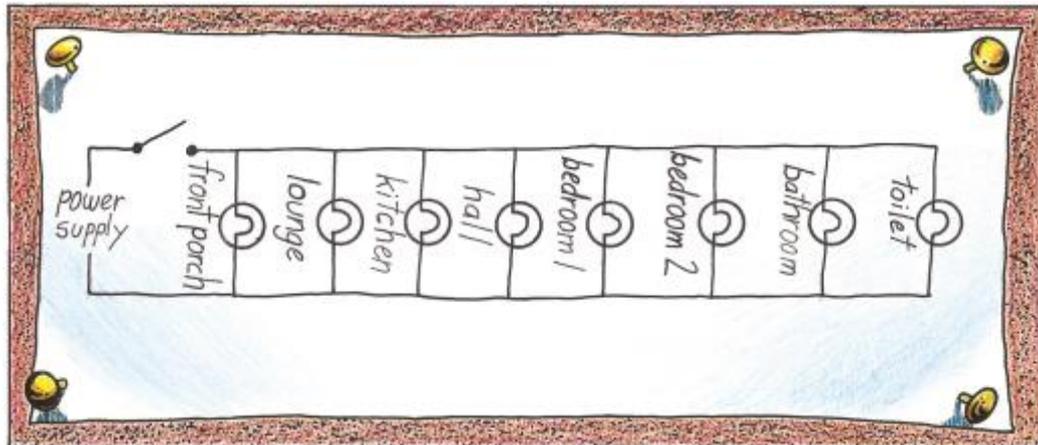
- (f) Determine the current that flows through each bulb in the parallel circuit. Show your calculations/reasoning.
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6.

- (a) Describe at least three ways in which a 12-volt dry cell differs from a 12-volt car battery.
.....

- (b) Explain why alkaline batteries are best used for devices such as digital cameras and torches.
.....

7. An apprentice electrician has designed a lighting circuit diagram (shown below) for a new house. Explain what is wrong with this circuit design.
.....
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8. If an electrical device has an insulated metal casing, its plug normally has two pins. If an electrical device has an uninsulated metal casing, its plug should have three pins. Explain the function of the third pin.
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Jacaranda Science Quest 9: Topic 10 test 3

Name: _____

1	An ammeter is used to measure: A electrical energy. B resistance. C voltage. D electric current.		1
2	A unit of electrical resistance is the: A ohm. B joule. C ampere. D volt.		1
3	The voltage in an electric circuit is a measure of: A the amount of electric charge passing through a circuit every second. B the amount of electrical energy gained or lost by electric charge as it moves through the circuit. C the amount of electrical energy transformed each second. D the electric current travelling through the circuit.		1
4	Which of the following represents a typical 'load' in an electric circuit? A A battery B A globe C A wire D A switch		1
5	The flow of electric charge in an electric circuit is called: A electric current. B electric power. C resistance. D voltage.		1

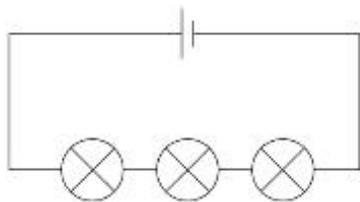
Topic 10 test 3

6	<p>If a 6-volt cell is connected in series with a 2-volt cell, the overall voltage obtained is:</p> <p>A 2 volts. B 4 volts. C 6 volts. D 8 volts.</p>		1
7	<p>The following is the circuit symbol for a</p> <p>A resistor. B battery. C globe. D push button.</p> 		1
8	<p>Which of the following is the best conductor of electricity?</p> <p>A Copper B Plastic C Globe element D Glass</p>		1
9	<p>A group of two or more cells is called:</p> <p>A an appliance. B a battery. C an alkaline D a packet.</p>		1
10	<p>The conducting path in a torch consists of:</p> <p>A the globe. B the filament, spring, metal strip and switch. C the filament and the switch. D the batteries.</p>		1
11	<p>An electric current of 500 mA is equal to:</p> <p>A 0.005 A. B 0.050 A. C 0.500 A. D 5000 A.</p>		1

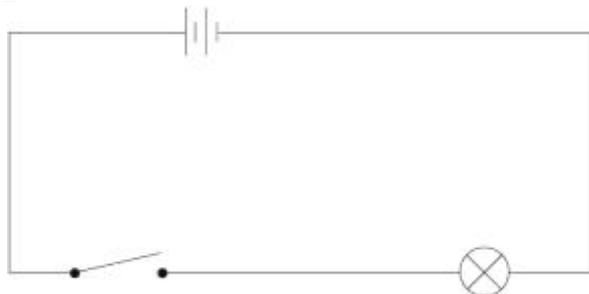
Topic 10 test 3

12 Which of the following is a series circuit?

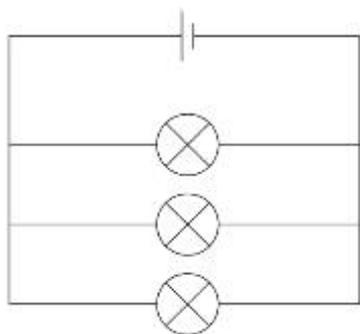
A



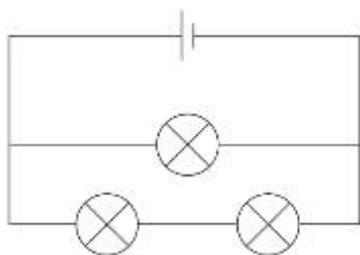
B



C



D



1

13 In a series circuit containing three glowing globes, if one globe 'blows', then:

- A the other two stop glowing.
- B the globe nearest the blown one stops glowing.
- C the other two globes are unaffected.
- D the other two globes dim.

1

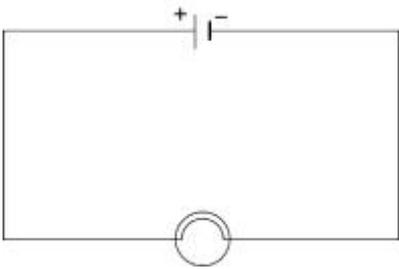
Topic 10 test 3

<p>14</p>	<p>Which of the following statements concerning electric cars is most accurate?</p> <p>A They will eliminate pollution associated with transport.</p> <p>B They will easily have greater travel range than petrol cars.</p> <p>C They will indirectly cause some pollution due to power generation used to recharge batteries.</p> <p>D Electric cars have not been made yet, but are not far away.</p>		<p>1</p>
<p>15</p>	<p>The electrodes in a car battery are surrounded by a solution of:</p> <p>A lead dioxide.</p> <p>B salt water.</p> <p>C hydrochloric acid.</p> <p>D sulfuric acid.</p>		<p>1</p>
<p>16</p>	<p>If the filament in light globe K shown in the circuit diagram below breaks:</p> <p>A globes J and L will both stop glowing.</p> <p>B globes J and L will continue to glow.</p> <p>C globe J will stop glowing and globe L will continue to glow.</p> <p>D globe L will stop glowing and globe J will continue to glow.</p> <div data-bbox="268 1196 671 1451" data-label="Diagram"> <p>The diagram shows a circuit with a 6V battery on the left. The circuit branches into two parallel paths. The first path contains globe J and globe K connected in series. The second path contains globe L. Both paths rejoin and return to the battery.</p> </div>		<p>1</p>
<p>17</p>	<p>A short circuit across the terminals of a light globe would result in:</p> <p>A a decrease in electric current flowing through the power supply.</p> <p>B an increase in electric current flowing through the power supply.</p> <p>C the light globe glowing less brightly.</p> <p>D the light globe glowing more brightly very briefly, before failing to glow.</p>		<p>1</p>

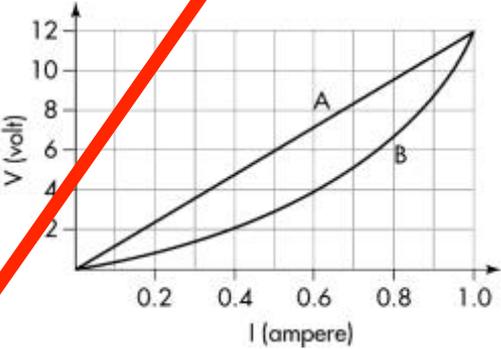
Topic 10 test 3

24	Explain why the conducting paths in electric appliances are usually made of metals like copper.		1
25	What happens to the electric current in a conductor if its resistance increases without changing the voltage across it?		1
26	In a light bulb, what two forms of energy is electrical energy changed into?		2
27	A torch circuit carries a current of 0.2 amps and has resistance 30 Ω . What is the voltage?		1
28	The electric current flowing through a torch globe is measured to be 200 mA when the voltage across it is 2.8 volts. What is the resistance of the torch globe at the time of measurement?		1
29	Identify the parts of circuits below. (a)  (b)  (c) 		3

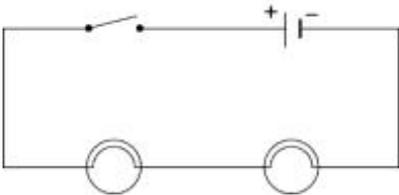
Topic 10 test 3

<p>30</p>	<p>Draw the circuit symbol for:</p> <p>(a) an open switch</p> <p>(b) two cells in series</p> <p>(c) a voltmeter.</p>		<p>3</p>
<p>31</p>	<p>Draw a circuit diagram to show where a voltmeter and ammeter should be placed in the following circuit to correctly measure the voltage across the globe and the current flowing through it. Use + and – signs on the meter symbols.</p> <div style="text-align: center;">  </div>		<p>3</p>
<p>32</p>	<p>Draw a diagram showing how to connect the following to make a globe glow: two short connecting leads, a cell, a globe.</p>		<p>2</p>
<p>33</p>	<p>What is the difference between current and voltage?</p>		<p>2</p>
<p>34</p>	<p>The electric current flowing through a lounge room globe decreases as the filament gets hotter. Has its resistance increased or decreased? Explain your answer.</p>		<p>3</p>

Topic 10 test 3

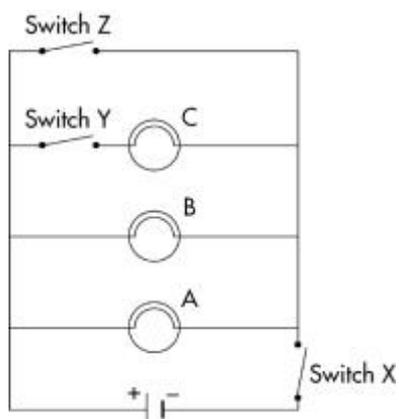
<p>35</p>	<p>The figure below is a graph of voltage drop (V) versus electric current (I) for two electrical devices A and B.</p> <p>(a) Which of the two devices is ohmic? How do you know?</p> <p>(b) What is the electrical resistance of device A?</p> <p>(c) What is the electrical resistance of device B when the electric current flowing through it is 400 mA?</p> 		<p>3</p>
<p>36</p>	<p>Draw a circuit containing a single cell and four globes in:</p> <p>(a) parallel</p> <p>(b) series.</p>		<p>2</p>
<p>37</p>	<p>One Christmas Eve, Santa accidentally snags his suit on a globe on a family's Christmas tree, breaking the globe in the process. About a hundred lights decorate the tree. What will happen to the other lights on the tree if they are:</p> <p>(a) in series with the broken one</p> <p>(b) in parallel with the others?</p>		<p>2</p>

Topic 10 test 3

40	<p>The lighting in a mountain hut is to be powered by a 24-volt battery. Design an electric circuit in which each of three lamps can be turned on or off separately. The circuit must also include a switch that can be used to turn all of the lamps off at once. Use the appropriate symbols in your circuit diagram.</p>		4
41	<p>Describe the circuit shown below in words.</p> 		2
42	<p>The electric current supplied to your home is called AC.</p> <p>(a) What does AC stand for?</p> <p>(b) How is AC different from DC?</p>		2
43	<p>The lights in a house are connected in parallel with each other. State two advantages of connecting them in parallel rather than in series.</p>		2

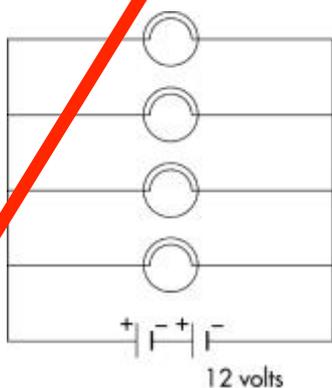
Topic 10 test 3

- 44 The circuit diagram below shows three lamps A, B and C connected in parallel. Three open switches X, Y and Z are added to the circuit as shown in the diagram. Which of the three lamps will glow if:
- only switch X is closed
 - switches X and Y are both closed while switch Z remains open
 - all three switches are closed?



3

- 45 Four identical light globes are connected in parallel as shown in the circuit below. Each globe has a resistance of $100\ \Omega$.
- The voltage across each globe is the same. What is the size of this voltage?
 - The electric current flowing through each of the globes is the same. What is the size of this electric current?
 - What is the size of the electric current flowing through the battery?



3