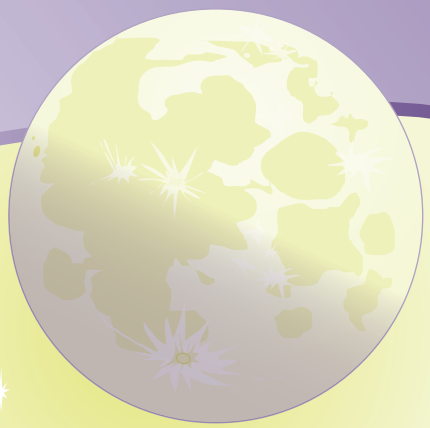
QCATs
Queensland Comparable Assessment Tasks

2009

6

SCIENCE

SAMPLE RESPONSES



Moon phases

This booklet is designed to help teachers make overall, on-balance judgments by providing examples of student responses. The responses are not an exhaustive set.

B samples

Queensland Government

Queensland Studies Authority
Partnership and innovation

Contact information:

Information about QCATs is available on the QSA website <www.qsa.qld.edu.au>.

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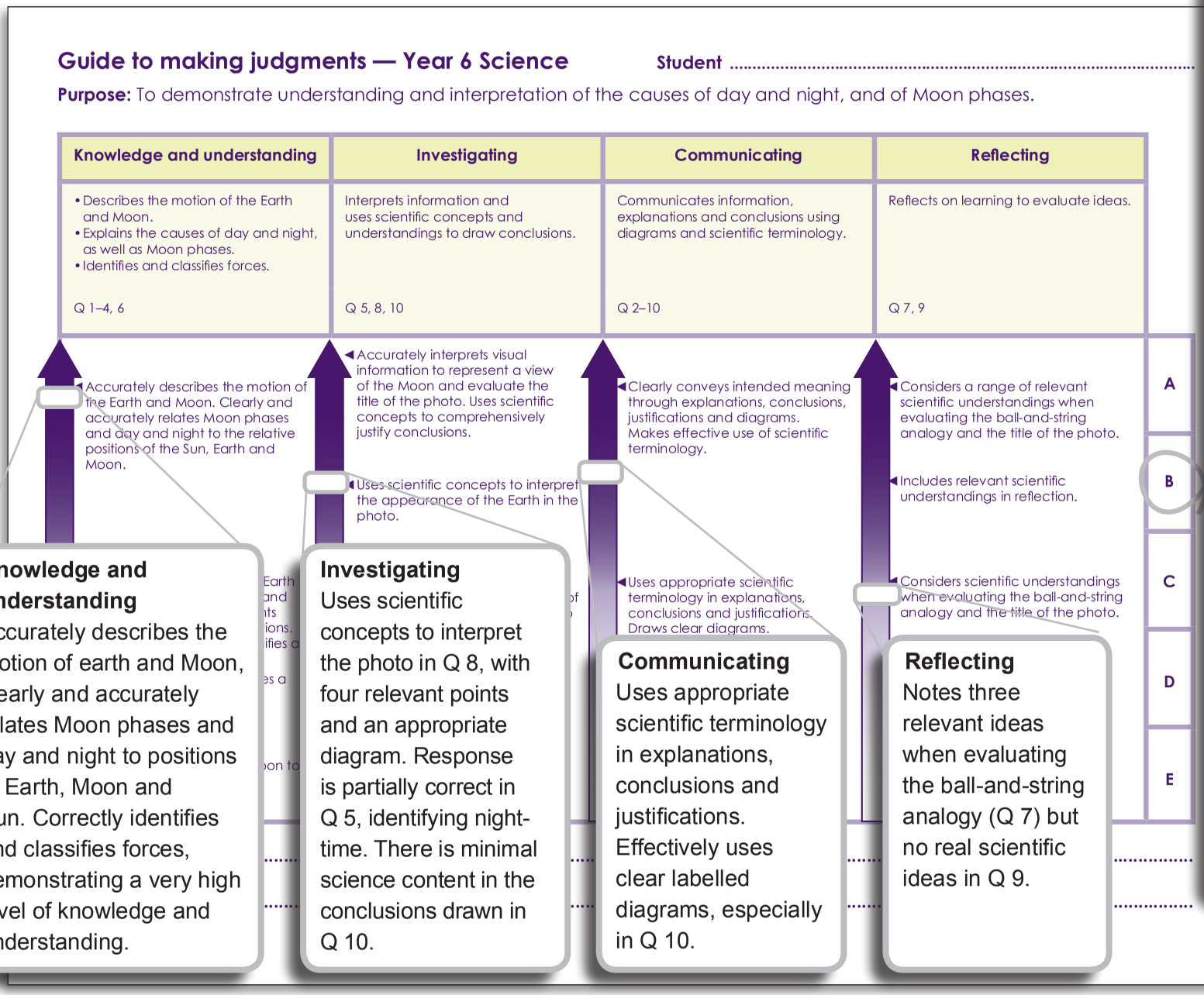
B Sample: Response 1



Knowledge and understanding
Accurately describes the motion of earth and Moon, clearly and accurately relates Moon phases and day and night to positions of Earth, Moon and Sun. Correctly identifies and classifies forces, demonstrating a very high level of knowledge and understanding.

Investigating
Uses scientific concepts to interpret the photo in Q 8, with four relevant points and an appropriate diagram. Response is partially correct in Q 5, identifying night-time. There is minimal science content in the conclusions drawn in Q 10.

Communicating
Uses appropriate scientific terminology in explanations, conclusions and justifications. Effectively uses clear labelled diagrams, especially in Q 10.

Reflecting
Notes three relevant ideas when evaluating the ball-and-string analogy (Q 7) but no real scientific ideas in Q 9.

Overall grade
The purpose of this QCAT is for students to demonstrate understanding and interpretation of the causes of day and night, and of moon phases. This response demonstrates variations in quality across the assessable elements. Knowledge and understanding of the causes of day, night and Moon phases are evidenced at a very high level. However, when applying that knowledge to interpreting information, drawing conclusions and communicating, the evidence indicates a high level, while reflecting on learning to evaluate ideas is sound. On balance this work is an overall B.

B Sample: Response 1

1. Choose words from the word list to complete the paragraphs below.

Word list					
Sun	~~Earth~~	Moon	~~orbit~~	in shadow	~~phases~~
~~sunrise~~	~~reflecting~~	~~28 days~~	~~24 hours~~	~~day~~	~~night~~

- Use Diagram 1 to help you.
- Not all of the words are used.

Earth rotates once every ..24 hours..... On the side facing the Sun, it is ...day..... and on the other side it is ...night..... because it is ..in....shadow.

Moonrise, ...sunrise..... and the appearance of the Sun and Moon moving across the sky are actually caused by the rotation of the Earth.

The Moon is in .....orbit..... around the Earth, taking about ..28..days..... for one revolution.

As it moves around the Earth, the Moon appears to go through changes in shape, called ....phases....., as we see more or less of the side that is ..reflecting light from the Sun.

While orbiting the Earth, the Moon also rotates slowly, almost exactly one turn during each orbit, so the same side is always facing the ...Earth..... .

5

B Sample: Response 1

Diagram 2: Phases of the Moon

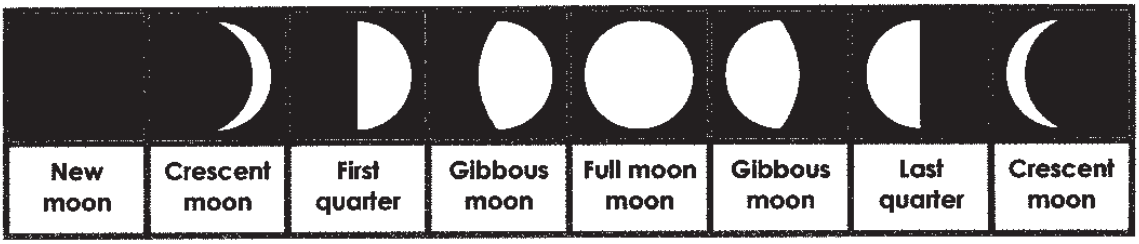


Diagram 3: Earth with the Moon in two different positions

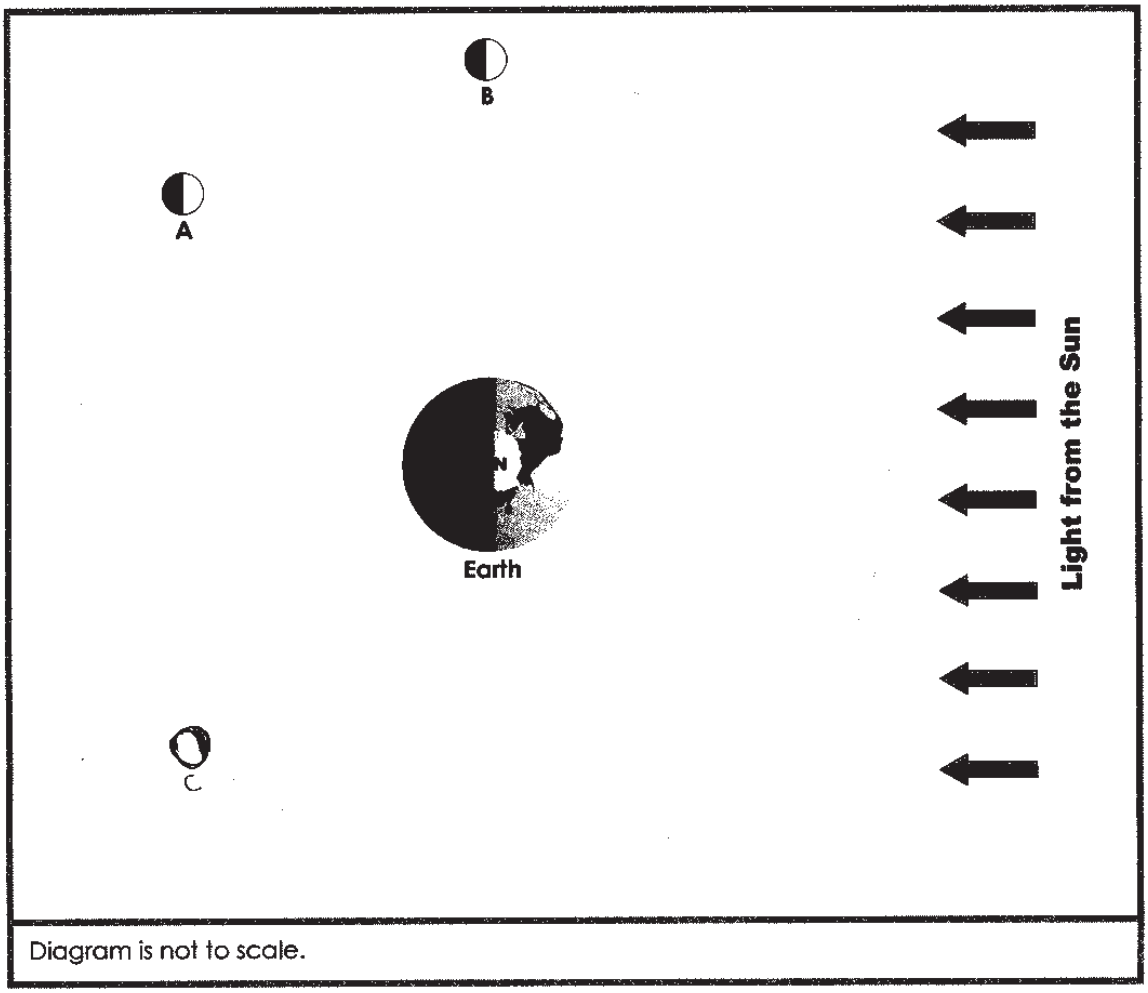


Diagram is not to scale.

6

B Sample: Response 1

Use Diagrams 2 and 3 to help you complete the following questions.

2. Shade in the shape and name the phase of the Moon when it is in position A.

View from Earth	Name of phase
	Gibbous moon

3. Shade in the shape and name the phase of the Moon when it is in position B.

View from Earth	Name of phase
	First quarter

4. Draw another moon in Diagram 3, according to the following instructions:

- **draw the Moon in a position to show the phase below**
- **label it C**
- **shade the dark side.**

View from Earth	Name of phase
	Crescent moon

7

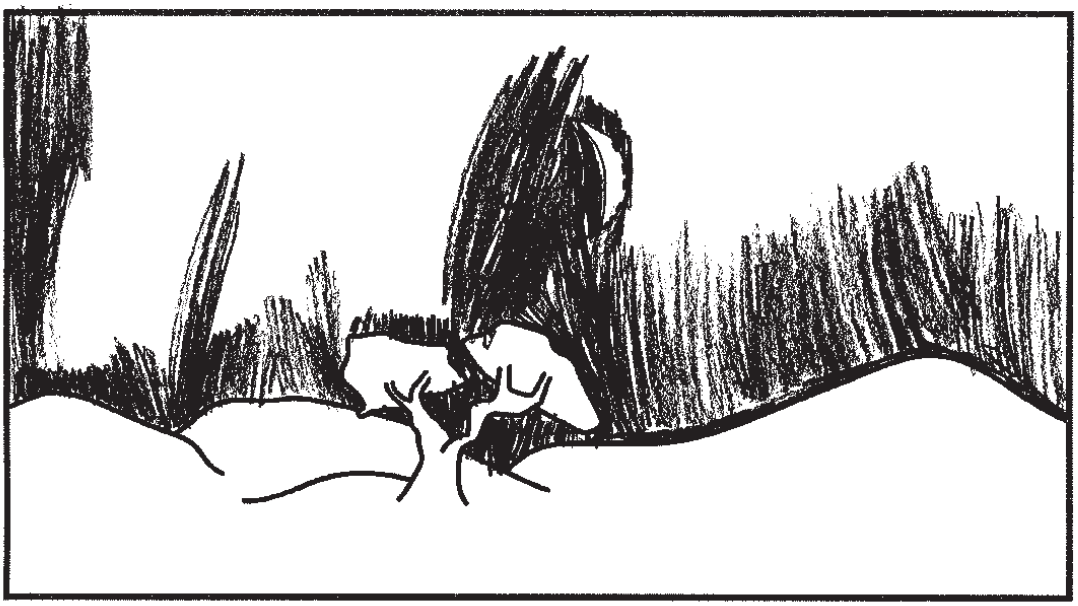
B Sample: Response 1

5. In the box below:

a) draw the phase of the Moon you would see from the position shown in Diagram 4

b) colour the sky to show whether it is day (blue) or night (black)

c) name the phase of the Moon: .....



9

B Sample: Response 1

6. Compare the ball and string with the actual Earth and Moon, by completing this table.

	The boy with the ball and string	The Earth and Moon
What are the forces stopping the Moon and ball from moving away? Choose from this list: • magnetism • gravity • reflection • string pulling in • string pulling out	string pulling in	gravity
Is the force a contact force or a force acting at a distance? Circle one in each case.	(a contact force) or a force acting at a distance	a contact force or (a force acting at a distance)
Does the same side of the Moon (or ball) always face Earth (or boy)? Circle one in each case.	(Yes) or No	(Yes) or No

7. Think about using the ball and string to explain the motion of the Moon.

What is useful about the ball and string?	What is **not** useful about the ball and string?
:Same side facing boy :ball orbits boy	:String holding ball

STOP HERE: WAIT FOR YOUR TEACHER'S DIRECTIONS

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B Sample: Response 1

Look at the photo of the Earth.

8. Explain why the Earth has that shape in the photo.

Think about what causes Moon phases.

- Because half is night, half is day
- Suns only on one half • Moon can only see light side sometimes
- The lit shape keeps changing because earth and moon are always moving

Draw a diagram to show what you mean.

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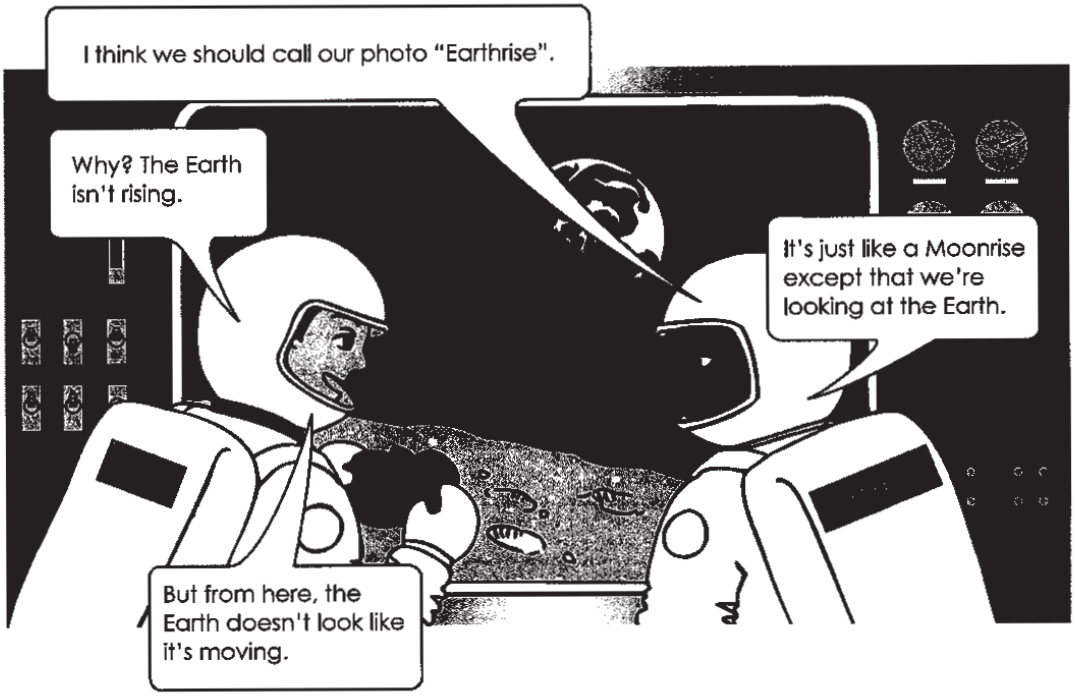
B Sample: Response 1

Here are two astronauts who have taken a similar photo.
The astronauts discussed what they should call it.



The Pilot and Commander disagree about whether "Earthrise" is a correct title.

9. List some science ideas they could use to support their opinions about "Earthrise".

- List all the evidence you can find to support one or both astronauts
- Look back over pages 4–11 for ideas.

Pilot: "The Earth isn't rising"	**Commander:** "Earthrise"
• The moon is actually rising •	• It looks like it's rising because ½ shadow • The Earth might actually be rising

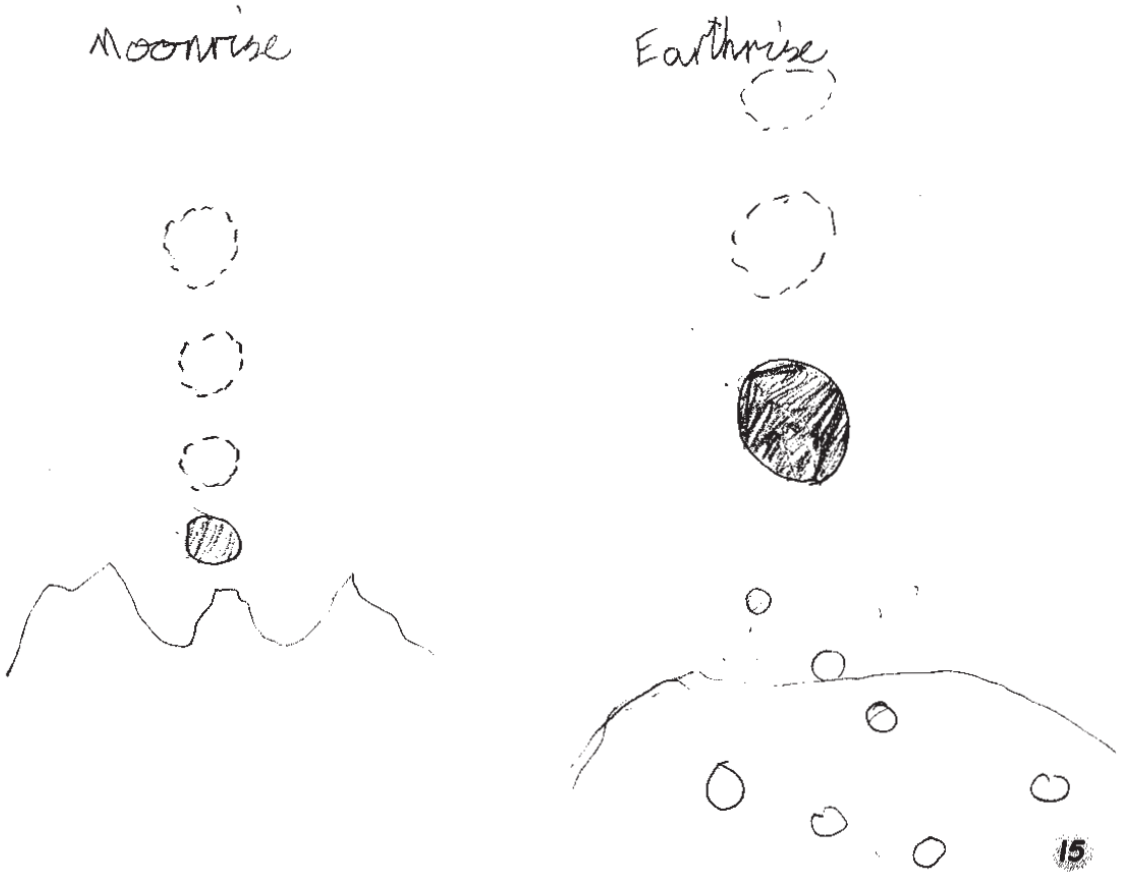
B Sample: Response 1

10. Decide which astronaut you agree with.

Give scientific reasons to explain your opinion. You may use a diagram.

I agree with the Commander because in the picture the Earth actually looks like it is rising from the moon.

and the Earth might actually be rising because we say a moonrise because that's what it looks like so "Earthrise" is a good name.



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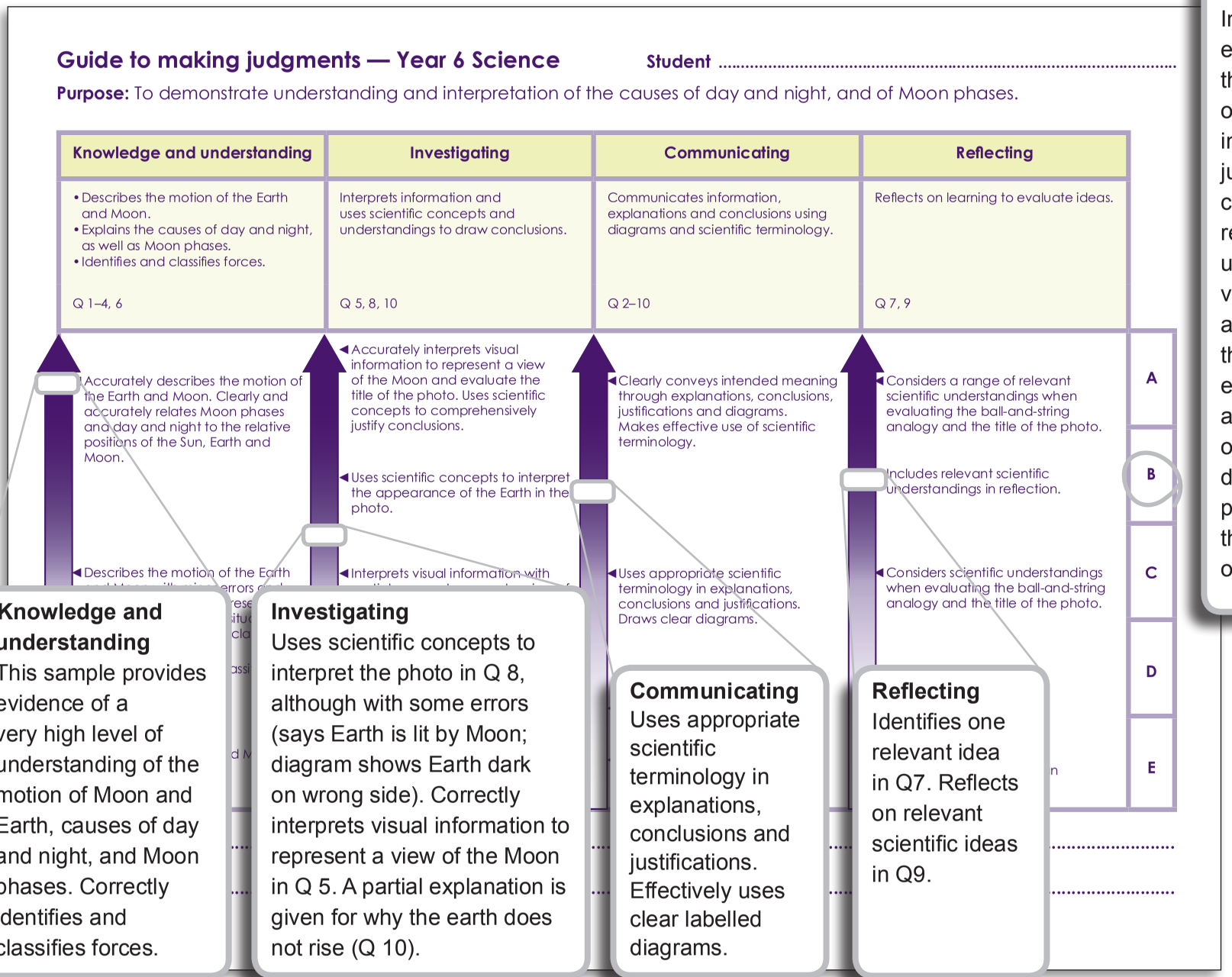
B Sample: Response 2



Knowledge and understanding
This sample provides evidence of a very high level of understanding of the motion of Moon and Earth, causes of day and night, and Moon phases. Correctly identifies and classifies forces.

Investigating
Uses scientific concepts to interpret the photo in Q 8, although with some errors (says Earth is lit by Moon; diagram shows Earth dark on wrong side). Correctly interprets visual information to represent a view of the Moon in Q 5. A partial explanation is given for why the earth does not rise (Q 10).

Communicating
Uses appropriate scientific terminology in explanations, conclusions and justifications. Effectively uses clear labelled diagrams.

Reflecting
Identifies one relevant idea in Q7. Reflects on relevant scientific ideas in Q9.

Overall grade
In this response, evidence for the processes of interpreting information, drawing justified conclusions, communicating and reflecting on scientific understandings is variable but generally at a high level. While there is evidence of excellent knowledge and understanding of the causes of day, night and Moon phases, on balance, this sample is an overall B.

B Sample: Response 2

1. Choose words from the word list to complete the paragraphs below.

Word list (Not all of the words are used)					
Sun	~~Earth~~	Moon	~~orbit~~	~~in shadow~~	~~phases~~
~~sunrise~~	reflecting	~~28 days~~	~~24 hours~~	~~daytime~~	~~night-time~~

• **Use Diagram 1 to help you.**

Earth rotates once every 24 hours. On the side facing the Sun, it is daytime and on the other side it is night-time because it is in shadow.

Moonrise, sunrise and the appearance of the Sun and Moon moving across the sky are actually caused by the rotation of the Earth. The Moon is in orbit around the Earth, taking about 28 days for one revolution.

As it moves around the Earth, the Moon appears to go through changes in shape, called phases as we see more or less of the side that is reflecting light from the Sun.

While orbiting the Earth, the Moon also rotates slowly, almost exactly one turn during each orbit, so the same side is always facing the Earth

5

B Sample: Response 2

Diagram 2: Phases of the Moon

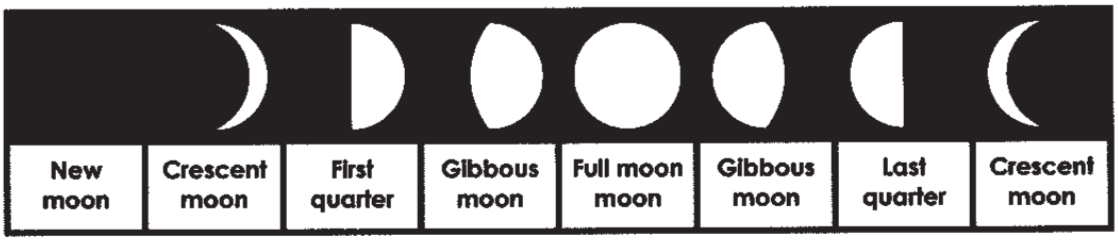


Diagram 3: Earth with the Moon in two different positions

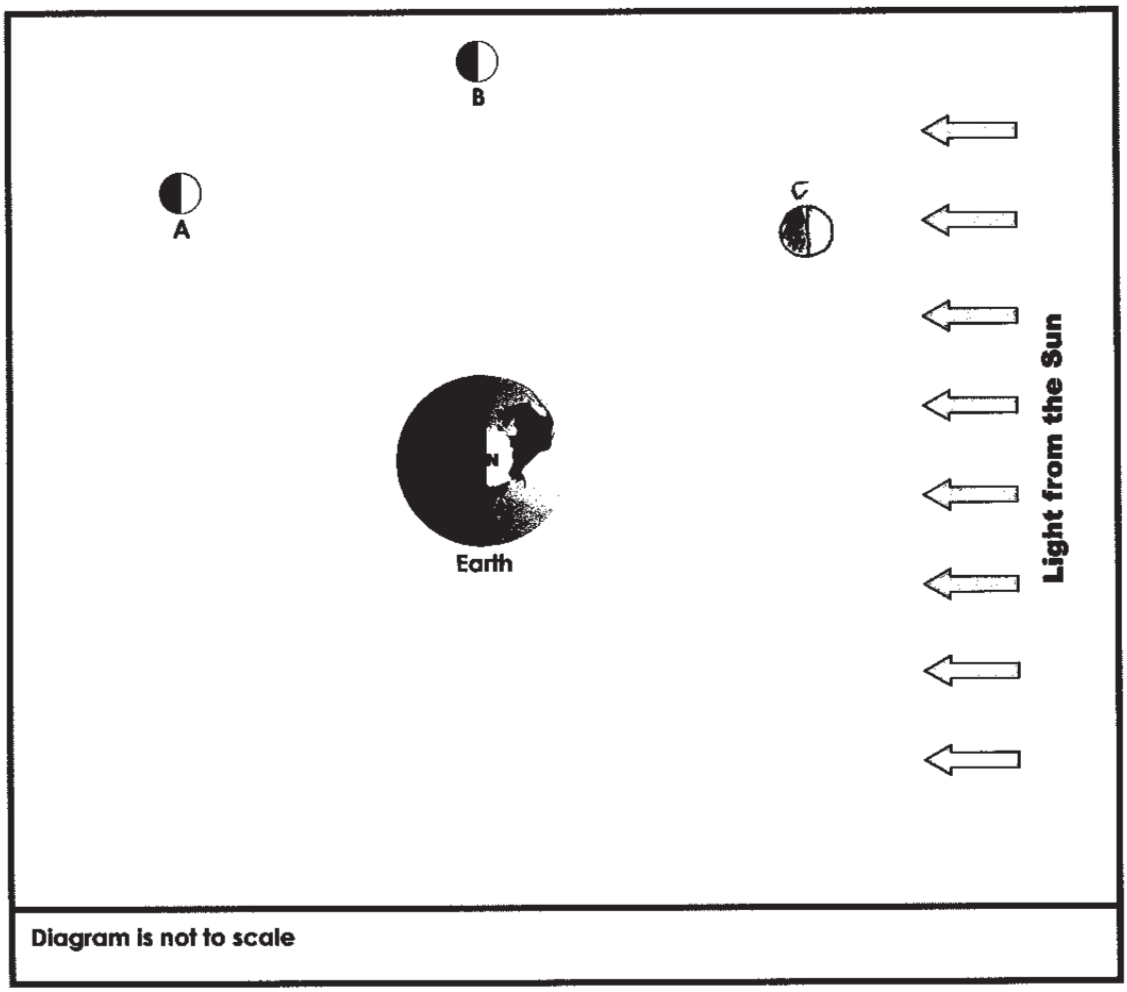


Diagram is not to scale

6

B Sample: Response 2

Use Diagrams 2 and 3 to help you complete the following.

2. Shade in the shape and name the phase of the Moon when it is in position A.

View from Earth	Name of phase
	Gibbous moon

3. Shade in the shape and name the phase of the Moon when it is in position B.

View from Earth	Name of phase
	first quarter

4. Draw another moon in Diagram 3, according to the following instructions:

- **draw the Moon in a position to show the phase below**
- **label it C**
- **shade the dark side.**

View from Earth	Name of phase
	Crescent moon

7

B Sample: Response 2

5. In the box below:

a) colour the sky to show whether it is day (blue) or night (black).

b) draw the phase of the Moon you would see from the position shown in Diagram 4.

c) name the phase of the Moon: Gibbous moon

9

B Sample: Response 2

6. Compare the ball and string with the actual Earth and Moon, by completing this table.

	The boy with the ball and string	The Earth and Moon
What are the forces stopping the Moon and ball from moving away? Choose from this list: *magnetism,* *gravity,* *reflection,* *string pulling in,* *string pulling out.*	string pulling in	gravity
Is the force a contact force or a force acting at a distance? Circle one in each case.	(a contact force) or a force acting at a distance	a contact force or (a force acting at a distance)
Does the same side of the Moon (or ball) always face Earth (or boy)? Circle one in each case.	(Yes) or No	(Yes) or No

7. Think about using the ball and string to explain the motion of the Moon.

What is useful about the ball and string?	What is **not** useful about the ball and string?
because the ball is acting like the moon and the boy is acting like the Earth	it doesn't tell you about the sun

STOP HERE: WAIT FOR YOUR TEACHER'S DIRECTIONS

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B Sample: Response 2

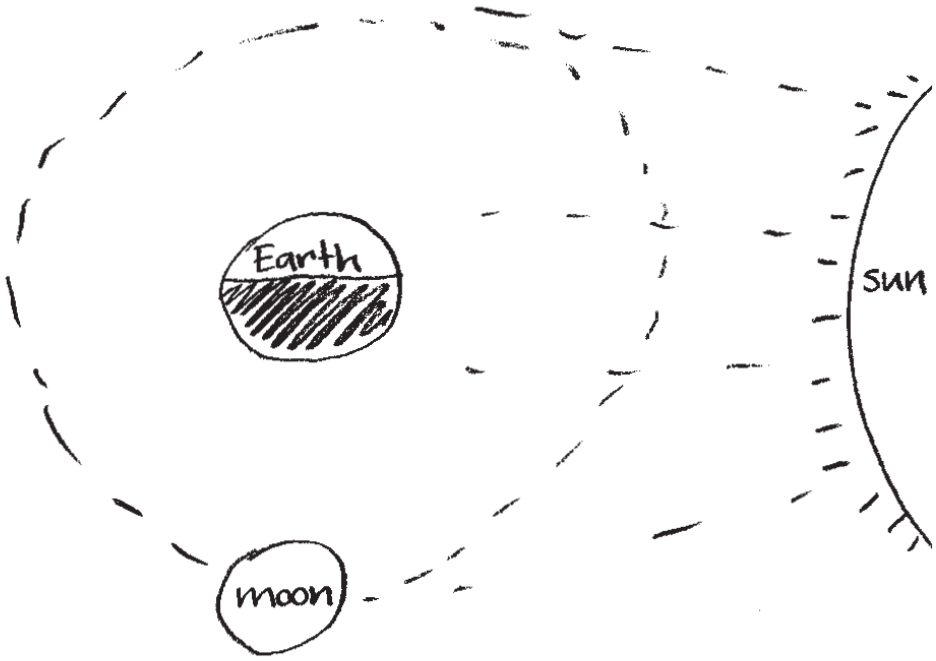
Look at the photo of the Earth.

8. Explain why the Earth has that shape in the photo.

- Think about what causes Moon phases.

because the moon is shining on half the Earth

Include a diagram to show what you mean.



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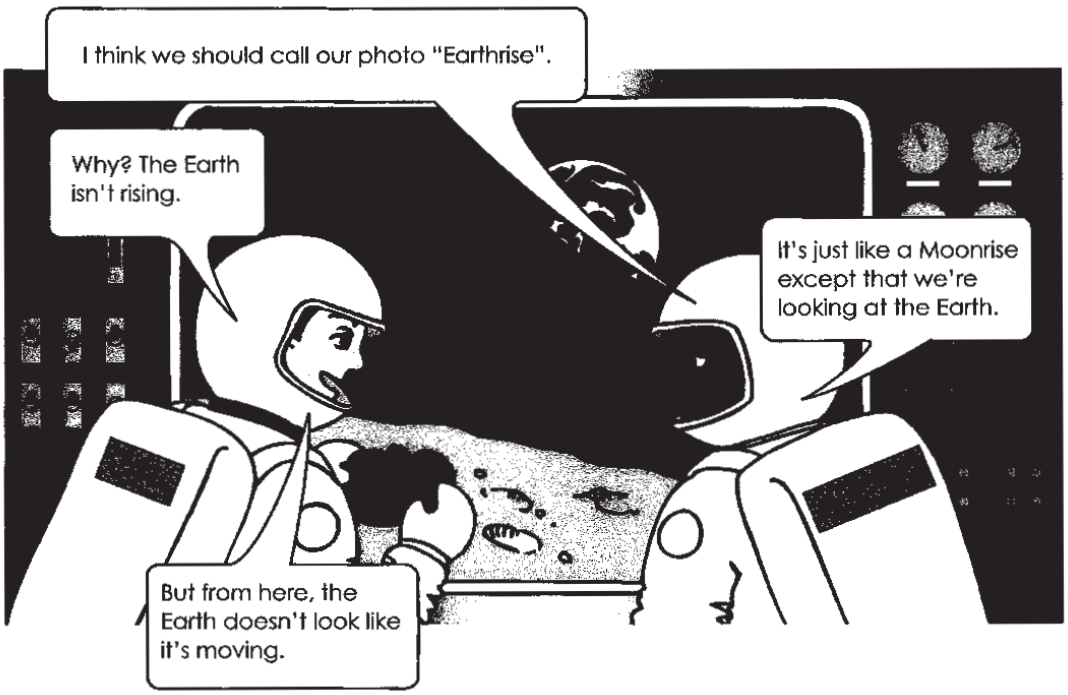
B Sample: Response 2

Here are two astronauts who have taken a similar photo.
The astronauts discussed what they should call it.



The Pilot and Commander disagree about whether "Earthrise" is a correct title.

9. List some science ideas they could use to support their opinions about "Earthrise".

- **List all the evidence you can find to support one or both astronauts**
- **Look back over pages 4-11 for ideas.**

Pilot: "The Earth isn't rising"	**Commander:** "Earthrise"
because as you can see on the photo and where it is now it is in the same spot I think we should call it half seen Earth	It might look like it's rising because the sunlit part is getting bigger

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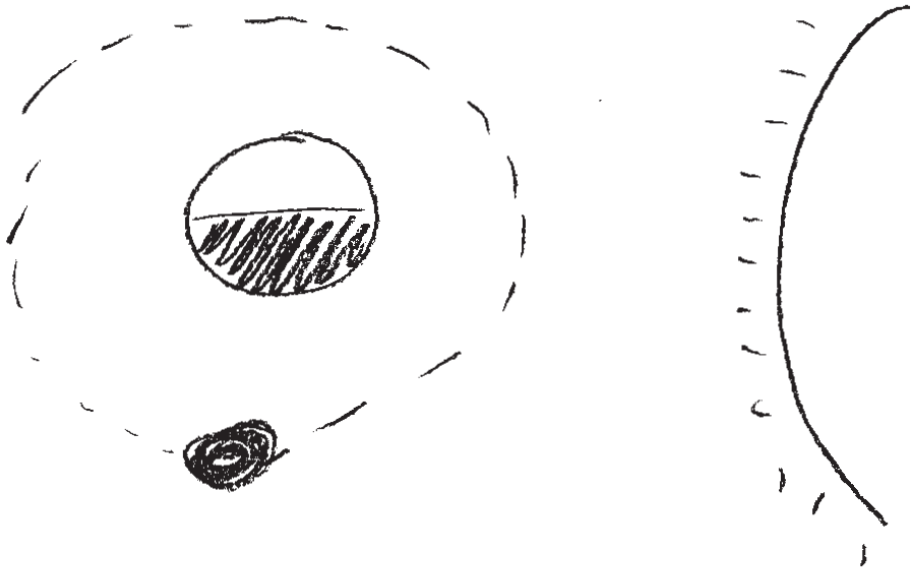
B Sample: Response 2

10. Decide which astronaut you agree with.

Give scientific reasons to explain your opinion. You may use a diagram.

I agree with Pilot because the Earth is not rising you can just only see half of the Earth and the Earth is also still in the same spot

and the Earth never ever rises



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