



Key Stage 2: Daytime Moon Viewing

Teacher's Notes

Curriculum Links: Unit 5E Earth, Sun and Moon, Unit 3F Light and Shadows

This extension activity uses daytime viewing of the Moon (during school hours) to reinforce ideas learned in the classroom about light, shadow and the Moon itself.

Equipment: Magnetic compass, notepads and pencils for students.

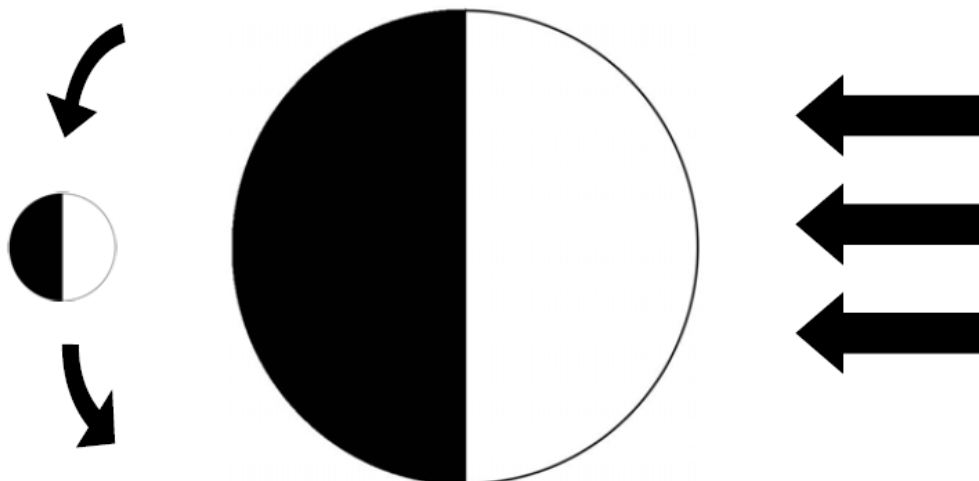
Optional: Set(/s) of binoculars, monoculars or telescopes for closer observation of the Moon, cameras.

Class discussion before the activity:

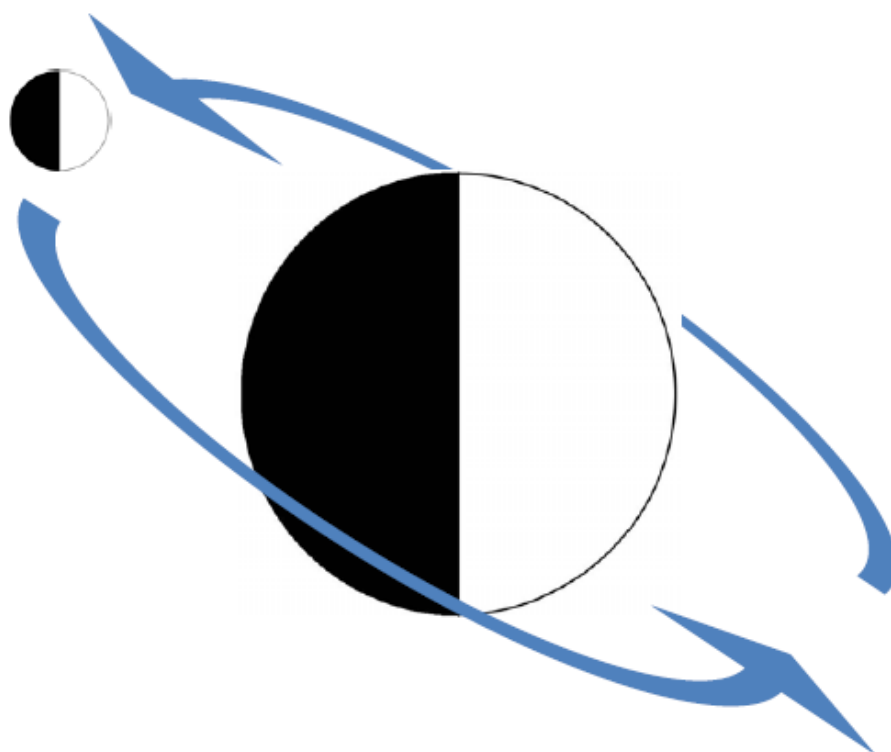
How can we see the Moon?

Answer: The light from the Sun reflects off the Moon and into our eyes or our telescopes. Reflections are how we see most things on a day-to-day basis. Sunlight also reflects off the planets and that is how we see them. Stars, like the Sun are light sources, while other objects are not.

Draw the Moon and Earth on the board as shown below, but with no shaded halves. The curved arrows represent the way the Moon orbits the Earth (viewed from a top-down perspective) and the straight arrows represent the light coming from the Sun. Ask students to copy the diagram and shade in the bits of the Earth and Moon that are in darkness, where the Sun's light does not reach.



Some students may ask how the light of the Moon can get to the Earth in the previous diagram. The orbit of the Moon is tilted with respect to Earth's orbit around the Sun – the diagram on the next page will help students visualise what is happening.



Size is to scale on both diagrams, but distance is not.

Is the Moon ever completely dark?

Answer: No. One side of the Moon is always lit up by the Sun. The only exception is when a lunar eclipse occurs. During this event the Moon is low enough in its orbit so that the Earth blocks the light of the Sun reaching the Moon. Even then, a small amount of light can get through Earth's atmosphere (giving the Moon a reddish hue during a lunar eclipse).

Having asked students to draw the first diagram; ask them when they think they would see a Full Moon?

Answer: A Full Moon can only be seen at night. Only a crescent, quarter and gibbous Moon can be seen during the day.

Relevant background information:

By viewing the Moon during the day, students will be able to study six of the eight phases of the Moon during school hours with the direct assistance of teachers. As the discussion illustrates, a Full Moon cannot be seen during the day. Also a New Moon cannot be seen when the Sun is shining on the far side of the Moon.

The tables at the end of this document give the times for moonrise and moonset between 5 September 2012 and 15 July 2013. For each date the time of moonrise and moonset are shown, as is the approximate direction these occur in. Also, the phase of the Moon is listed for each date. There is a selection of dates for viewing each lunar cycle during the day to allow some flexibility in choosing days to bring the class out to view the Moon.

Here are some tips for choosing good dates to view:

- Viewing on the dates with waxing phases (waxing crescent, first quarter and waxing gibbous) is best done later in the school day to allow the Moon to rise high enough in the sky (above buildings/ trees).
- Viewing on the dates with waning phases (waning crescent, last quarter and waning gibbous) is best done as early as possible during the school day before the Moon sets.
- If your class will be viewing a crescent Moon try to pick dates that are not too long before the first quarter phase or not too long after the last quarter phase, as a very thin crescent Moon can be difficult to see in the daytime sky.
- Always begin each session with a reminder not to look directly at the Sun. Some care has been taken to choose dates where the Sun and the Moon are not too close to one another in the sky, but caution should always be exercised.

Activity:

If telescopes or binoculars are available then students can take turns looking at the Moon (with direct supervision from teachers). However, the main objectives for students should be to:

1. Draw the phase of the Moon in their notepads along with the date and time.
2. Look at their shadows to identify the direction the Sun is in without looking at it and drawing an arrow below their Moon drawing to indicate the direction the Sun is in.
3. If students have cameras, supervise taking pictures of the Moon – again ensuring that students do not direct their cameras to the Sun.

These are quick outdoor sessions, but can be extended if cameras and/ or binoculars are available. When one lunar cycle is complete, students will have a record of the waxing and waning lunar phases. To explore more about the movement of the Moon and its phases in the classroom see the 'Phases of the Moon' extension activity.

The tables overleaf are for viewing from London and the Moon will be highest in the sky half-way between Moonrise and Moonset. NOTE: Clocks go back to GMT on 28/10/12 and clocks go forward to BST (GMT+1) on 31/03/13.

For further Moonrise and Moonset times outside of the periods here (and for different locations) go to:

www.timeanddate.com/worldclock/moonrise.html

Moonrise NSEW Moonset NSEW Phase

5 th September 2012	8:45 PM*	NE	11:52 AM	NW	Waning Gibbous
6 th September 2012	9:13 PM*	NE	12:55 PM	NW	Waning Gibbous
7 th September 2012	9:45 PM*	NE	1:53 PM	NW	Waning Gibbous
8 th September 2012	10:24 PM*	NE	2:46 PM	NW	Last Quarter
9 th September 2012	11:11 PM*	NE	3:33 PM	NW	Waning Crescent
10 th September 2012	12:04 AM	NE	4:13 PM	NW	Waning Crescent
11 th September 2012	1:05 AM	NE	4:47 PM	NW	Waning Crescent
19 th September 2012	11:10 AM	SE	8:25 PM	SW	Waxing Crescent
20 th September 2012	12:27 PM	SE	9:09 PM	SW	Waxing Crescent

4 th October 2012	7:45 PM*	NE	11:42 AM	NW	Waning Gibbous
5 th October 2012	8:22 PM*	NE	12:37 PM	NW	Waning Gibbous
6 th October 2012	9:05 PM*	NE	1:26 PM	NW	Waning Gibbous
7 th October 2012	9:55 PM*	NE	2:08 PM	NW	Waning Gibbous
8 th October 2012	10:52 PM*	NE	2:44 PM	NW	Last Quarter
9 th October 2012	11:55 PM*	NE	3:15 PM	NW	Waning Crescent
10 th October 2012	1:02 AM	NE	3:42 PM	NW	Waning Crescent
11 th October 2012	2:13 AM	NE	4:06 PM	NW	Waning Crescent
19 th October 2012	12:26 PM	SE	8:56 PM	SW	Waxing Crescent
20 th October 2012	1:19 PM	SE	10:05 PM	SW	Waxing Crescent

GMT

4 th November 2012	7:44 PM*	NE	11:43 AM	NW	Waning Gibbous
5 th November 2012	8:44 PM*	NE	12:15 PM	NW	Waning Gibbous
6 th November 2012	9:48 PM*	NE	12:43 PM	NW	Waning Gibbous
7 th November 2012	10:55 PM*	NE	1:07 PM	NW	Last Quarter
8 th November 2012	12:05 AM	NE	1:30 PM	W	Waning Crescent
9 th November 2012	1:17 AM	E	1:53 PM	W	Waning Crescent
18 th November 2012	11:35 AM	SE	9:18 PM	SW	Waxing Crescent
19 th November 2012	12:05 PM	SE	10:33 PM	W	Waxing Crescent
20 th November 2012	12:30 PM	E	11:46 PM	W	First Quarter
21 st November 2012	12:52 PM	E	12:57 AM**	W	Waning Crescent
22 nd November 2012	1:13 PM	E	2:05 AM**	W	Waning Crescent

3 rd December 2012	7:38 PM*	NE	10:46 AM	NW	Waning Gibbous
4 th December 2012	8:44 PM*	NE	11:11 AM	NW	Waning Gibbous
5 th December 2012	9:51 PM*	NE	11:34 AM	W	Waning Gibbous
6 th December 2012	11:01 PM*	E	11:56 AM	W	Last Quarter
7 th December 2012	12:13 AM	E	12:18 PM	W	Waning Crescent
8 th December 2012	1:27 AM	E	12:42 PM	SW	Waning Crescent
9 th December 2012	2:44 AM	SE	1:09 PM	SW	Waning Crescent
17 th December 2012	10:33 AM	SE	9:29 PM	SW	Waxing Crescent
18 th December 2012	10:57 AM	E	10:43 PM	W	Waxing Crescent
19 th December 2012	11:19 AM	E	11:54 PM	W	Waxing Crescent
20 th December 2012	11:40 AM	E	-	-	First Quarter
21 st December 2012	-	-	1:02 AM	NW	Waxing Gibbous
22 nd December 2012	12:02 PM	NE	2:09 AM	NW	Waxing Gibbous
23 rd December 2012	12:25 PM	NE	3:14 AM	NW	Waxing Gibbous

	Moonrise	NSEW	Moonset	NSEW	Phase
3 rd January 2013	10:01 PM*	E	10:24 AM	W	Waning Gibbous
4 th January 2013	11:13 PM*	E	10:47 AM	W	Waning Gibbous
5 th January 2013	12:26 AM	SE	11:12 AM	SW	Last Quarter
6 th January 2013	1:42 AM	SE	11:40 AM	SW	Waning Crescent
7 th January 2013	2:59 AM	SE	12:16 PM	SW	Waning Crescent
16 th January 2013	9:44 AM	E	10:45 PM	W	Waxing Crescent
17 th January 2013	10:07 AM	NE	11:55 PM	NW	Waxing Crescent
18 th January 2013	10:30 AM	NE	1:02 AM**	NW	First Quarter
19 th January 2013	10:55 AM	NE	2:06 AM**	NW	Waxing Gibbous
20 th January 2013	11:25 AM	NE	3:07 AM**	NW	Waxing Gibbous
21 st January 2013	11:59 AM	NE	4:04 AM**	NW	Waxing Gibbous
22 nd January 2013	12:39 PM	NE	4:56 AM**	NW	Waxing Gibbous

4 th February 2013	1:59 AM	SE	10:57 AM	SW	Waning Crescent
5 th February 2013	3:10 AM	SE	11:46 AM	SW	Waning Crescent
14 th February 2013	8:33 AM	NE	10:44 PM	NW	Waxing Crescent
15 th February 2013	8:58 AM	NE	11:50 PM	NW	Waxing Crescent
16 th February 2013	9:26 AM	NE	12:54 AM**	NW	Waxing Crescent
17 th February 2013	9:58 AM	NE	1:53 AM**	NW	First Quarter
18 th February 2013	10:36 AM	NE	2:47 AM**	NW	Waxing Gibbous
19 th February 2013	11:21 AM	NE	3:35 AM**	NW	Waxing Gibbous
20 th February 2013	12:11 PM	NE	4:16 AM**	NW	Waxing Gibbous
21 st February 2013	1:09 PM	NE	4:52 AM**	NW	Waxing Gibbous

6 th March 2013	3:01 AM	SE	11:44 AM	SW	Waning Crescent
7 th March 2013	3:47 AM	SE	12:56 PM	SW	Waning Crescent
16 th March 2013	7:58 AM	NE	11:39 PM	NW	Waxing Crescent
17 th March 2013	8:34 AM	NE	12:36 AM**	NW	Waxing Crescent
18 th March 2013	9:15 AM	NE	1:26 AM**	NW	Waxing Crescent
19 th March 2013	10:03 AM	NE	2:10 AM**	NW	First Quarter
20 th March 2013	10:58 AM	NE	2:48 AM**	NW	Waxing Gibbous
21 st March 2013	11:57 AM	NE	3:20 AM**	NW	Waxing Gibbous
22 nd March 2013	1:01 PM	NE	3:49 AM**	NW	Waxing Gibbous

BST

3 rd April 2013	2:46 AM	SE	11:48 AM	SW	Last Quarter
4 th April 2013	3:25 AM	SE	1:02 PM	SW	Waning Crescent
5 th April 2013	3:58 AM	SE	2:16 PM	SW	Waning Crescent
14 th April 2013	8:11 AM	NE	12:18 AM**	NW	Waxing Crescent
15 th April 2013	8:57 AM	NE	1:05 AM**	NW	Waxing Crescent
16 th April 2013	9:48 AM	NE	1:45 AM**	NW	Waxing Crescent
17 th April 2013	10:45 AM	NE	2:19 AM**	NW	Waxing Crescent
18 th April 2013	11:46 AM	NE	2:48 AM**	NW	First Quarter
19 th April 2013	12:51 PM	NE	3:14 AM**	NW	Waxing Gibbous

1 st May 2013	1:26 AM	SE	10:51 AM	SW	Waning Gibbous
2 nd May 2013	2:01 AM	SE	12:07 PM	SW	Last Quarter
3 rd May 2013	2:30 AM	SE	1:22 PM	SW	Waning Crescent
4 th May 2013	2:56 AM	E	2:35 PM	W	Waning Crescent
5 th May 2013	3:19 AM	E	3:46 PM	W	Waning Crescent

	Moonrise	NSEW	Moonset	NSEW	Phase
14 th May 2013	8:36 AM	NE	12:19 AM**	NW	Waxing Crescent
15 th May 2013	9:35 AM	NE	12:50 AM**	NW	Waxing Crescent
16 th May 2013	10:38 AM	NE	1:17 AM**	NW	Waxing Crescent
17 th May 2013	11:42 AM	NE	1:41 AM**	NW	Waxing Crescent
18 th May 2013	12:49 PM	E	2:04 AM**	W	First Quarter
30 th May 2013	12:33 AM	SE	11:09 AM	SW	Waning Gibbous
31 st May 2013	1:01 AM	E	12:24 PM	W	Last Quarter

1st June 2013	1:25 AM	E	1:37 PM	W	Waning Crescent
2nd June 2013	1:48 AM	E	2:47 PM	W	Waning Crescent
3 rd June 2013	2:11 AM	E	3:56 PM	NW	Waning Crescent
12 th June 2013	8:28 AM	NE	11:21 PM	NW	Waxing Crescent
13 th June 2013	9:32 AM	NE	11:46 PM	NW	Waxing Crescent
14 th June 2013	10:37 AM	NE	12:08 AM**	W	Waxing Crescent
15 th June 2013	11:44 AM	E	12:30 AM**	W	Waxing Crescent
16 th June 2013	12:53 PM	E	12:53 AM**	W	First Quarter
28 th June 2013	11:29 PM*	E	11:21 AM	W	Waning Gibbous
29 th June 2013	11:53 PM*	E	12:35 PM	W	Waning Gibbous
30 th June 2013	12:17 AM	E	1:46 PM	NW	Last Quarter

1 st July 2013	12:41 AM	NE	2:54 PM	NW	Waning Crescent
2 nd July 2013	1:07 AM	NE	4:00 PM	NW	Waning Crescent
12 th July 2013	9:35 AM	E	10:37 PM	W	Waxing Crescent
13 th July 2013	10:42 AM	E	10:59 PM	W	Waxing Crescent
14 th July 2013	11:51 AM	E	11:22 PM	W	Waxing Crescent
15 th July 2013	1:02 PM	SE	11:47 PM	SW	Waxing Crescent

***These times are from the day before so the Moon has already risen come the start of this date**

****These times are for the following day when the Moon sets**