



Key Stage 3: Daytime Moon Viewing

Teacher's Notes

Curriculum Links: Sci 7L – The Solar System and Beyond; Sci 8K - Light

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.

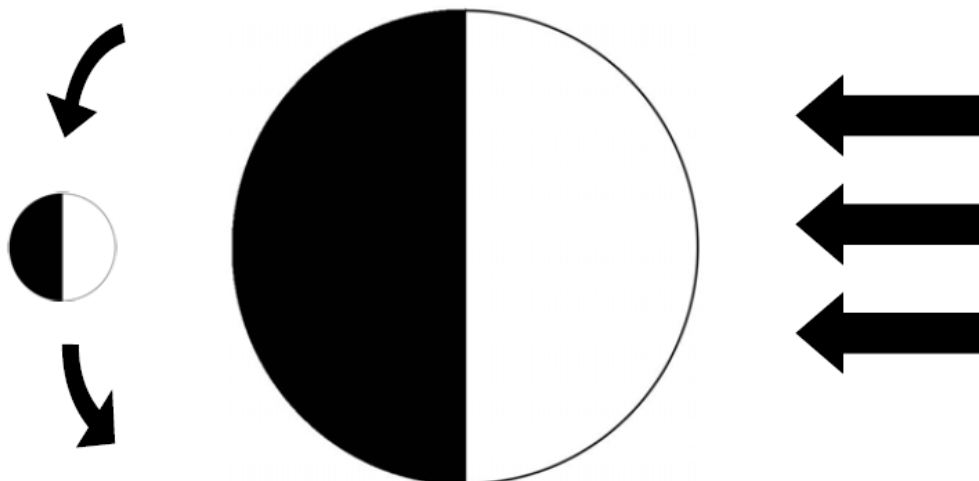
Optional: Set(/s) of binoculars, monoculars or telescopes for closer observation of the Moon, cameras.

Class discussion before the activity:

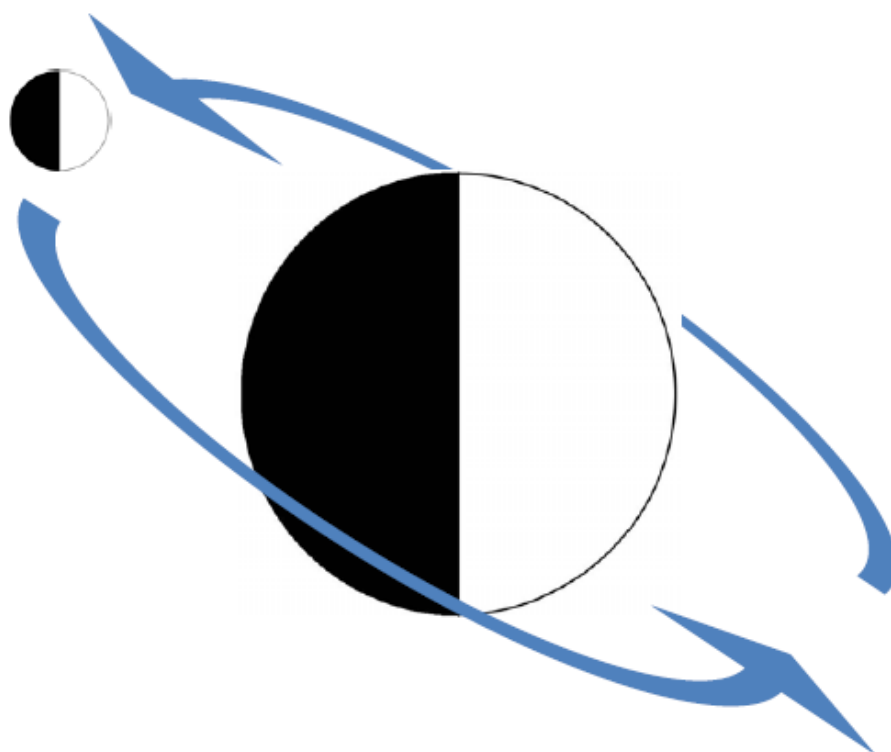
How can we see the Moon?

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 below 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 1 September 2011 and 1 August 2012. 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 KS3 '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 30/10/11 and clocks go forward to BST (GMT+1) on 25/03/12.

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

1st Sep 2011	10:55	NE	20:45	NW	Waxing Crescent
2nd Sep 2011	12:18	NE	21:17	NW	Waxing Crescent
16th Sep 2011	20:15	NE	12:10	NW	Waning Gibbous
17th Sep 2011	20:46	NE	13:12	NW	Waning Gibbous
18th Sep 2011	21:23	NE	14:08	NW	Waning Gibbous
19th Sep 2011	22:10	NE	14:58	NW	Waning Gibbous
20th Sep 2011	23:07	NE	15:40	NW	Last Quarter
21st Sep 2011	-	NE	15:40	NW	Waning Crescent
22nd Sep 2011	00:13	NE	16:15	NW	Waning Crescent

29th Sep 2011	09:52	SE	19:16	SW	Waxing Crescent
30th Sep 2011	11:16	SE	19:54	SW	Waxing Crescent
1st Oct 2011	12:32	SE	20:42	SW	Waxing Crescent
16th Oct 2011	20:08	NE	12:53	NW	Waning Gibbous
17th Oct 2011	21:00	NE	13:36	NW	Waning Gibbous
18th Oct 2011	22:02	NE	14:13	NW	Waning Gibbous
19th Oct 2011	23:10	NE	14:43	NW	Waning Gibbous
20th Oct 2011	-	NE	14:43	NW	Last Quarter
21st Oct 2011	00:24	NE	15:09	NW	Waning Crescent

GMT

29th Oct 2011	11:19	SE	19:25	SW	Waxing Crescent
30th Oct 2011	11:19	SE	19:30	SW	Waxing Crescent
31st Oct 2011	12:05	SE	20:41	SW	Waxing Crescent
1st Nov 2011	12:40	SE	21:53	SW	Waxing Crescent
2nd Nov 2011	13:07	SE	23:05	SW	First Quarter
3rd Nov 2011	13:30	SE	00:15	SW	Waxing Gibbous
15th Nov 2011	20:01	NE	11:45	NW	Waning Gibbous
16th Nov 2011	21:12	NE	12:12	NW	Waning Gibbous
17th Nov 2011	22:26	NE	12:35	NW	Waning Gibbous
18th Nov 2011	23:42	E	12:57	W	Last Quarter
19th Nov 2011	-	-	12:57	W	Waning Crescent
20th Nov 2011	01:01	E	13:18	W	Waning Crescent

27th Nov 2011	09:54	SE	18:18	SW	Waxing Crescent
28th Nov 2011	10:36	SE	19:32	SW	Waxing Crescent
29th Nov 2011	11:07	SE	20:47	SW	Waxing Crescent
30th Nov 2011	11:32	SE	22:00	SW	Waxing Crescent
1st Dec 2011	11:53	SE	23:10	W	Waxing Crescent
2nd Dec 2011	12:12	E	00:18	W	First Quarter
3rd Dec 2011	12:29	E	01:24	W	Waxing Gibbous
4th Dec 2011	12:47	E	02:30	NW	Waxing Gibbous
5th Dec 2011	13:06	NE	03:36	NW	Waxing Gibbous
6th Dec 2011	13:28	NE	04:41	NW	Waxing Gibbous
15th Dec 2011	21:31	NE	11:03	NW	Waning Gibbous
16th Dec 2011	22:48	E	11:24	W	Waning Gibbous
17th Dec 2011	-	-	11:24	W	Waning Gibbous
18th Dec 2011	00:05	E	11:45	W	Last Quarter
19th Dec 2011	01:25	SE	12:08	SW	Waning Crescent
20th Dec 2011	02:46	SE	12:35	SW	Waning Crescent

	Moonrise	NSEW	Moonset	NSEW	Phase
27th Dec 2011	09:33	SE	19:37	SW	Waxing Crescent
28th Dec 2011	09:56	SE	20:50	SW	Waxing Crescent
29th Dec 2011	10:16	E	22:01	W	Waxing Crescent
30th Dec 2011	10:35	E	23:09	W	Waxing Crescent
31st Dec 2011	10:53	E	00:16	NW	First Quarter
1st Jan 2012	11:11	NE	01:22	NW	Waxing Gibbous
2nd Jan 2012	11:32	NE	02:27	NW	Waxing Gibbous
3rd Jan 2012	11:55	NE	03:32	NW	Waxing Gibbous
4th Jan 2012	12:24	NE	04:35	NW	Waxing Gibbous
5th Jan 2012	12:59	NE	05:34	NW	Waxing Gibbous
15th Jan 2012	-	-	10:14	SW	Waning Gibbous
16th Jan 2012	00:33	SE	10:39	SW	Last Quarter
17th Jan 2012	01:53	SE	11:10	SW	Waning Crescent

26th Jan 2012	08:39	E	20:50	W	Waxing Crescent
27th Jan 2012	08:58	E	21:58	W	Waxing Crescent
28th Jan 2012	09:16	NE	23:05	NW	Waxing Crescent
29th Jan 2012	09:36	NE	00:11	NW	Waxing Crescent
30th Jan 2012	09:58	NE	01:17	NW	Waxing Crescent
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1st Feb 2012	10:57	NE	03:20	NW	Waxing Gibbous
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3rd Feb 2012	12:25	NE	05:04	NW	Waxing Gibbous
4th Feb 2012	13:23	NE	05:45	NW	Waxing Gibbous

24 th Feb 2012	07:22	E	20:49	NW	Waxing Crescent
25 th Feb 2012	07:41	NE	21:56	NW	Waxing Crescent
26 th Feb 2012	08:03	NE	23:01	NW	Waxing Crescent
27 th Feb 2012	08:27	NE	0:05	NW	Waxing Crescent
28 th Feb 2012	08:57	NE	1:06	NW	Waxing Crescent
29 th Feb 2012	09:33	NE	2:03	NW	Waxing Crescent
1 st March 2012	10:16	NE	2:54	NW	First Quarter
2 nd March 2012	11:09	NE	03:37	NW	Waxing Gibbous
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BST

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27 th March 2012	08:32	NE	00:53	NW	Waxing Crescent
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1 st April 2012	13:11	NE	04:10	NW	Waxing Gibbous
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17 th May 2012	03:18	NE	17:30	NW	Waning Crescent

24 th May 2012	07:44	NE	23:44	NW	Waxing Crescent
25 th May 2012	08:48	NE	00:14	NW	Waxing Crescent
26 th May 2012	09:56	NE	00:40	NW	Waxing Crescent
27 th May 2012	11:07	NE	01:03	NW	Waxing Crescent
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29 th May 2012	13:35	E	01:47	W	Waxing Gibbous
12 th June 2012	01:04	E	14:14	NW	Waning Crescent
13 th June 2012	01:24	NE	15:21	NW	Waning Crescent
14 th June 2012	01:45	NE	16:26	NW	Waning Crescent
15 th June 2012	02:09	NE	17:30	NW	Waning Crescent

24 th June 2012	10:09	NE	23:32	W	Waxing Crescent
25 th June 2012	11:23	E	23:53	W	Waxing Crescent
26 th June 2012	12:38	E	00:15	W	Waxing Crescent
9 th July 2012	23:29	E	13:07	NW	Waning Gibbous
10 th July 2012	23:50	NE	14:13	NW	Waning Gibbous
11 th July 2012	-	-	14:13	NW	Last quarter
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