

Make your own Body Clock



How do we know when it's time to eat, sleep and wake?

Pupils make their own 'body clock medallion' to take home. They will learn what hormones are involved in some key bodily functions in a 24 hour period. This activity is designed for students aged 8-12 and is a craft activity designed to stimulate discussion around hormonal control of everyday biological processes.

Aims:

- To introduce the concept of circadian rhythms, their physiological effects and individual variances
- To introduce the key hormones involved in regulating our body clock

Curriculum links:

- Human reproduction
- Coordination and control
- Health: non-communicable diseases

Take home messages:

- Hormones regulate our body clocks
- Our body clock tells us when it's time to eat, sleep and wake up
- Key hormones:
 - **Cortisol** levels build up in our body while we sleep and signals to us that it's time to wake up. Have you ever notice that you wake up every morning at the same time? Or just before your alarm goes off? This is because of your hormones!
 - **Ghrelin** is produced by the stomach; it promotes appetite, uptake of food and storage of fat. It tells our brain that we're hungry and it's time for lunch!
 - **Leptin** is produced by fat cells when we eat and signals to the brain that we're full. Leptin deficiency leads to obesity as people don't know when they're full and should stop eating. This shows that obesity has a genetic basis and isn't always due to life style.
 - **Melatonin** is higher in the evening and at night when we are asleep. It makes us feel tired and reduces our body temperature – helping us fall asleep. Disrupted pattern of melatonin is why we suffer from jet lag when we travel to a different time zone.

Discussion points:

1. How do our bodies know it is time to sleep and time to wake up?
 - Endocrine organs release hormones in response to cues like light levels, blood sugar levels. The hormones act as messaging molecules that act on other organs in the body.
 - Melatonin is a good example – more is released from the pineal gland in the brain when there is less light coming into the eye and increasing melatonin levels have effects on the eyes and how heavy they feel, providing our body with a with a physical signal that it is time to sleep.
2. Humans and other species have biological clocks throughout the body, all controlled by a 'master-clock' in the brain - this varies between individuals – some people are 'night owls' and others are 'morning larks' – we know that there is a genetic basis for these differences
3. Scientists have found our body clock preferences change through life – the very young and the very old tend to wake up earlier, teenagers' body clocks tend to make them wake up later – there have been debates about whether secondary schools should start later in the morning so students feel more alert.

*see additional discussion resources at end of document

Make your own body clock!



 Your body has its own clock!

 Special signalling molecules called hormones tell our bodies

- When to wake up
- When to eat and when we are full
- When to go to sleep

 Different hormones increase and decrease in waves throughout the day

 You can make your own body clock like the one below to take home—just follow the instructions on the other side of this leaflet.



How to make your own body clock!



SLEEP

What time do you wake up and what time do you go to sleep?

Use a ruler to draw lines showing these times and colour in the 'awake time' with a green pencil and the 'asleep time' with a blue pencil



WAKE



EAT

What time in the day do you feel most hungry?

Use a felt-tip pen to draw a picture of the food you like to eat at the time you get most hungry



EAT

Now look at the chart below to colour-code your body clock with sticky dots to help you remember the hormones that make your body tick!



REPEAT

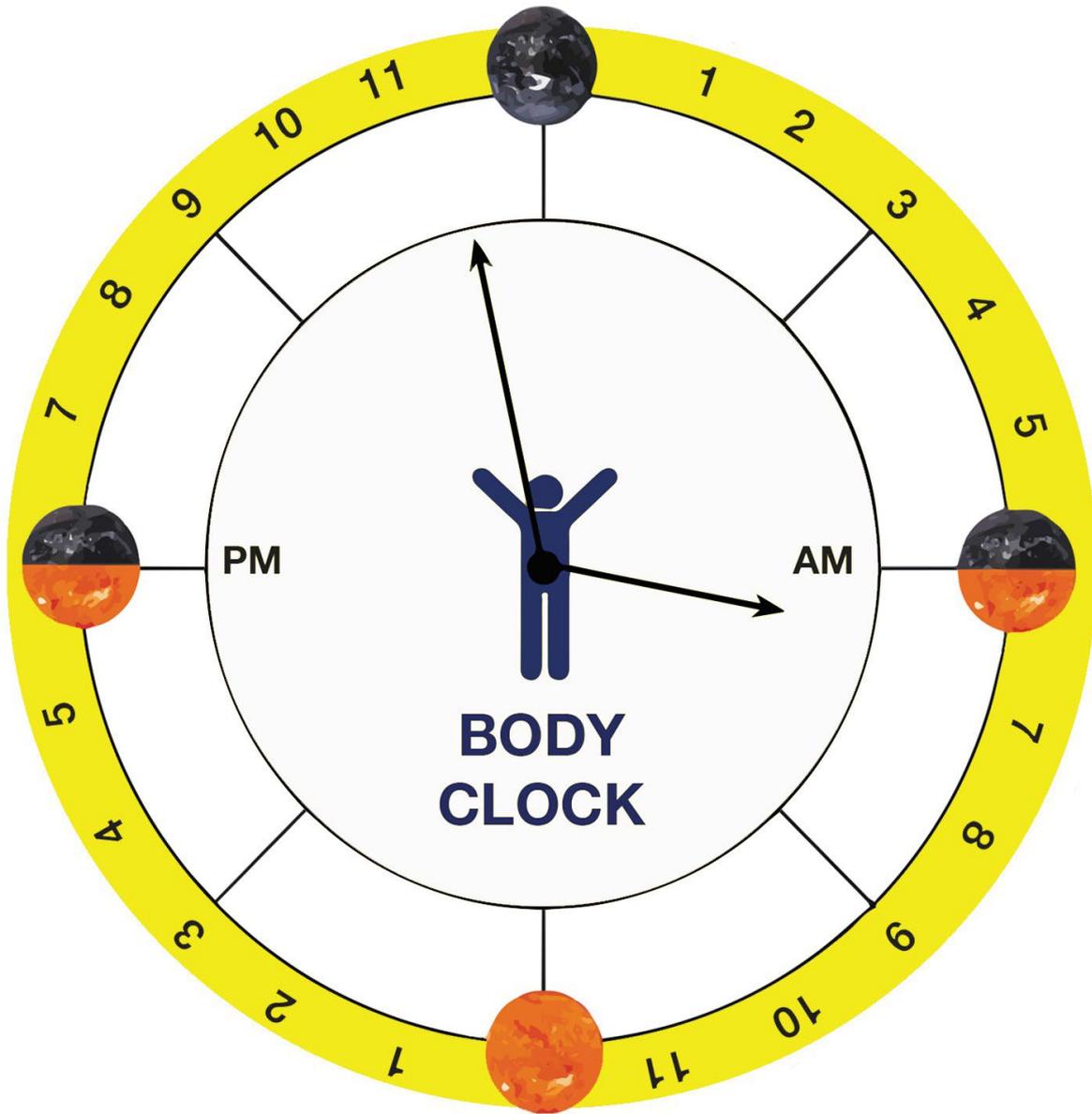
Get an adult to help with this bit - the final touch is to punch a hole in the top of your clock then thread a ribbon through so you can wear it home like a medallion!



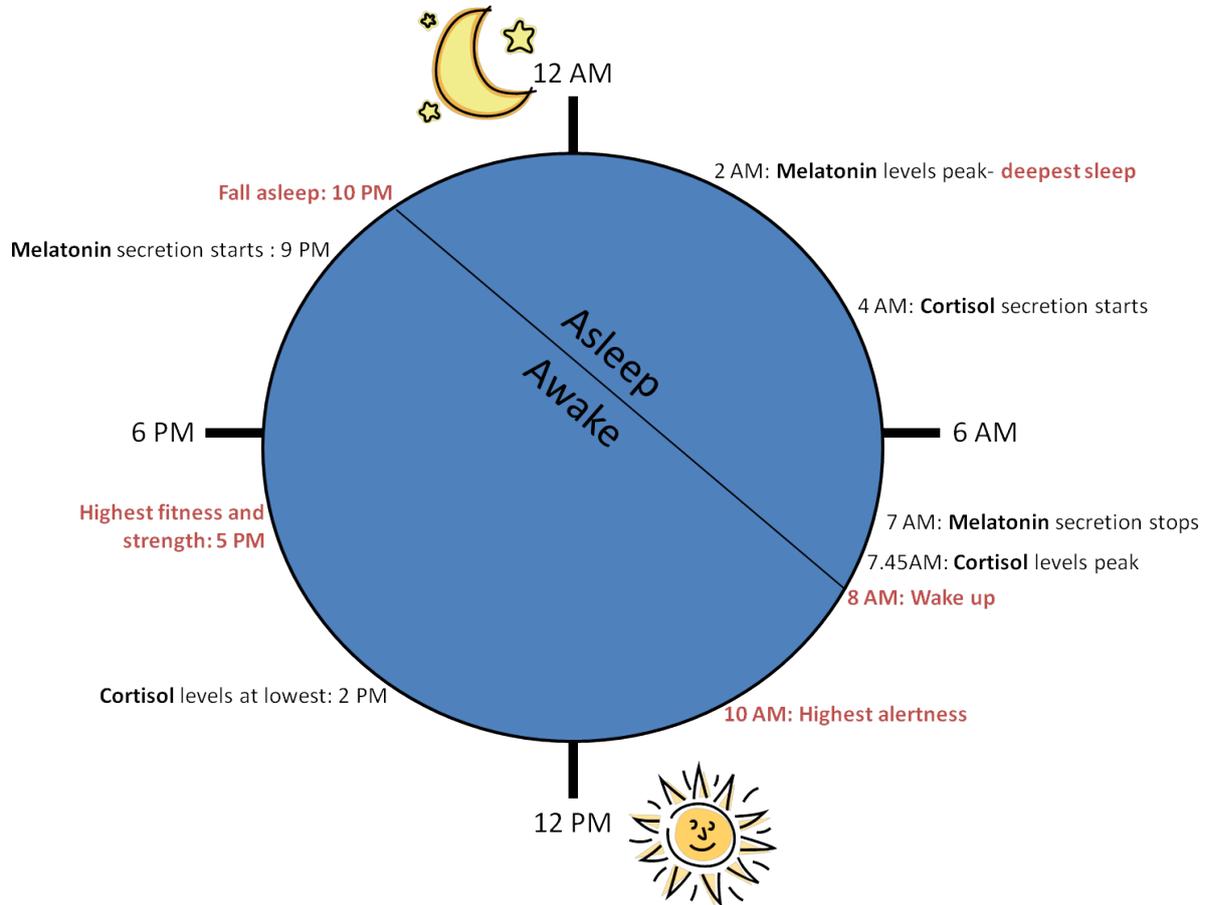
REPEAT

-  Cortisol is made and released by glands in our kidneys. Cortisol controls how we get energy from our foods and how our lungs and heart work.
-  Ghrelin is made by our stomachs -it sends messages to our brains to tell us we are hungry
-  Leptin is made by our fat cells and tells our bodies when we are full
-  Melatonin is made in our pineal gland in our brains— more is released when it is dark. Melatonin makes our bodies feel sleepy.

Body Clock template:



Background information:



Additional discussion resources:

Teenage pupils deserve 11am lie-in, says head

Adolescents benefit from a later start to the day, claims Oxford professor after tests on memory

Paul Gallagher

The Observer, Sunday 8 March 2009

 [Jump to comments \(101\)](#)



A tired teenager, sleeping in late. Photograph: Alamy/Alamy

A pioneering headteacher is calling for all secondary schools to follow his lead and start classes at 11am, allowing teenagers two hours extra in bed.

'Tired teenagers' at Surrey school to start lessons later

COMMENTS (294)



A-level students at Hampton Court House School will start their lessons after lunch and finish in the evening

Sixth formers at a private school in Surrey are to begin their lessons in the afternoons to allow them to sleep later in the mornings.

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14 May 2014 Last updated at 11:43

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Body Clock: Six things we learned

By James Gallagher
Health and science reporter, BBC News

- If you need an alarm clock, you need more sleep.
- Physical strength fluctuates during the day – Olympic swimmers don't like mornings!
- The body clock changes the way we function during the day, including the way our bodies respond to drugs.
- Late meals make you fat.
- Blue light is keeping you awake – looking at smartphones/laptops etc at night causes melatonin levels to decrease and cortisol to increase disrupting your sleep cycle.

Sleep Hormones and Light

Sleep hormones and light – looking at blue lights and orange glasses and how they help you wake up and go to sleep. Discussion on this could centre on the use of smart phones or laptops in bed and the way that this disrupts your sleep pattern.



We sleep at night and are awake during the day because day light, blue light specifically, decrease our levels of melatonin.

Using smart phones and laptops in bed at night can disrupt sleep patterns because they also emit blue light.



- Orange glasses filter out blue light and help you sleep during the day (really useful for people who work night shifts)



- Blue light alarm clock helps to wake you up in the morning