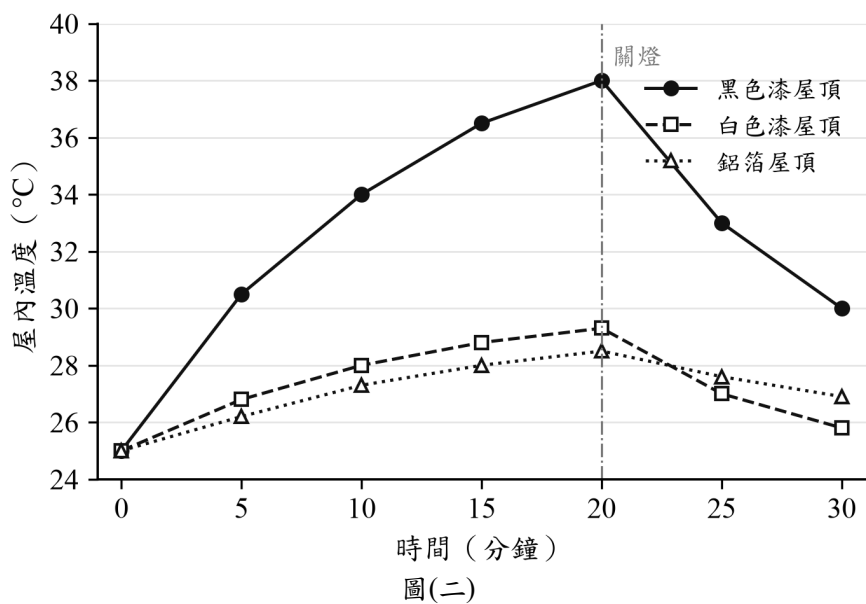
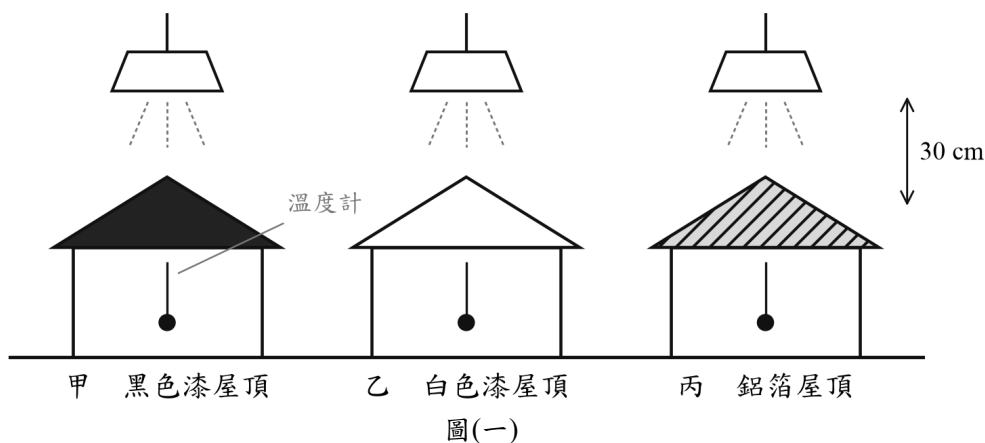


屋頂換件衣服，房子就涼了嗎？

閱讀下列敘述後，回答 1～5 題。

世界氣象組織（WMO）在 2025 年 1 月公布：2024 年是有觀測紀錄以來最熱的一年，全球平均氣溫比工業革命前（1850～1900 年）高出約 1.55°C 。都市裡的屋頂整天被太陽照射，頂樓房間常悶熱難耐，因此許多城市開始推廣「涼屋頂」：把屋頂漆成淺色，或鋪上反光材料。

小晴的小組想比較不同屋頂表面對屋內溫度的影響。他們用同樣大小、同樣材質的紙盒做成三間小屋，屋頂分別塗上黑色漆、白色漆與貼上鋁箔，每間小屋正上方 30 公分處各有一盞相同的燈，屋內中央各放一支溫度計，如圖(一)。實驗開始時三間屋內都是 25.0°C ；開燈 20 分鐘後關燈，再記錄 10 分鐘，結果如圖(二)。



小組查資料後發現，一個表面的溫度不只和它「吸收多少光」有關，也和它「以輻射方式把熱散發出去的能力」有關。

- () 1. 根據圖(二)，開燈的 20 分鐘內，甲屋屋內溫度平均每分鐘約上升多少 $^{\circ}\text{C}$ ？
(A) 0.33 (B) 0.65 (C) 1.3 (D) 1.9
- () 2. 開燈期間，乙屋升溫明顯比甲屋慢。下列解釋何者最合理？
(A) 白色表面把照到的光反射掉較多，吸收的能量較少
(B) 白色表面完全不吸收光，屋內的熱全部來自紙盒側面
(C) 白色漆塗得比黑色漆厚，熱比較不容易傳進屋內
(D) 白色屋頂使屋內空氣對流變快，把熱帶走
- () 3. 關燈時（第 20 分鐘）丙屋比乙屋涼，但第 25、30 分鐘時丙屋反而比乙屋熱。下列推論何者最合理？
(A) 丙屋關燈時溫度較低，所以降溫較慢，與屋頂表面無關
(B) 鋁箔屋頂以輻射散熱的能力較弱，熱比較不容易散出去
(C) 關燈後鋁箔仍持續吸收燈的光，使丙屋繼續加熱
(D) 丙屋的溫度計在關燈後故障，數據不可信
- () 4. 小晴主張：「開燈時鋁箔屋頂的屋子最涼，所以臺灣所有房子都應該改鋪鋁箔屋頂。」下列評論何者最恰當？
(A) 支持，因為圖(二)中丙屋的最高溫度最低
(B) 還不能這樣主張；實驗只用燈照 20 分鐘，真實房屋整天日照、夜裡還要散熱，鋁箔散熱較慢可能讓夜晚較悶熱，需在更接近真實的條件下比較
(C) 不能下結論，因為三間小屋的起始溫度都一樣
(D) 反對，因為黑色屋頂關燈後降溫最多，黑色屋頂才最適合
- () 5. 小組想進一步探討「屋頂表面對夜間屋內溫度的影響」。下列哪一個設計最恰當？
(A) 晚上把三間小屋放到戶外，屋頂換成不同顏色，紙盒大小也各不相同
(B) 在室內把燈連續開 24 小時，每小時記錄一次溫度
(C) 把三間小屋並排放在戶外同一處，從中午連續記錄到隔天清晨，比較日落後各屋的溫度變化
(D) 只用黑色屋頂的小屋，比較它白天與晚上的溫度

Phones Off, Lights Out?

Read the school newspaper article and the letter, and answer questions 1–5.

On December 10, 2025, a new law took effect in Australia: children under 16 can no longer have accounts on many social media apps, such as TikTok and Instagram. The news got students at Hillside Junior High talking about one question: is the phone really the problem?

Ms. Lin’s science class decided to find out, so they asked 120 students two questions: “How long do you look at a screen in the two hours before bed?” and “How many hours do you usually sleep on school nights?” The chart shows what they found.

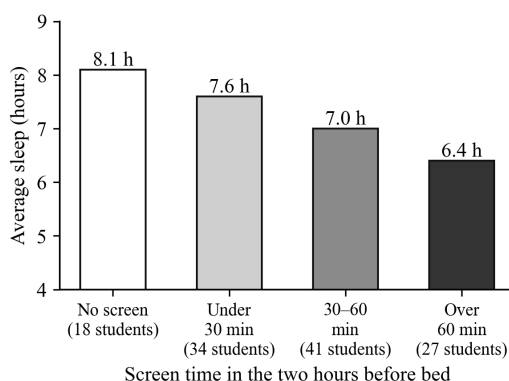


Chart: Screen time before bed and sleep (120 students)

“Students who used screens for over an hour slept almost two hours less than students who didn’t use them at all,” says Kevin, a student in the class.

Sleep doctors in the United States say that teens aged 13 to 18 need 8 to 10 hours of sleep a night. In the chart, only one group’s average reached 8 hours.

But Ms. Lin thinks the class should be careful. “The chart does not tell the whole story,” she says. “Maybe screens keep students awake. But maybe students who already have trouble sleeping pick up their phones because they can’t fall asleep.”

Next month, right after the final exams end, the class will try something new to test the idea: thirty students will leave their phones outside their bedrooms for two weeks and write down how long they sleep each night. If the same students sleep longer without their phones, the class will have better evidence that screens make a difference.

Dear Editor,

I read your article about screens and sleep. I am in the “over 60 minutes” group, but I don’t use social media at all. I watch calm music videos on my phone in bed, and they help me fall asleep. Maybe the question is not how long we use our phones, but what we do with them.

— Amy, Grade 8

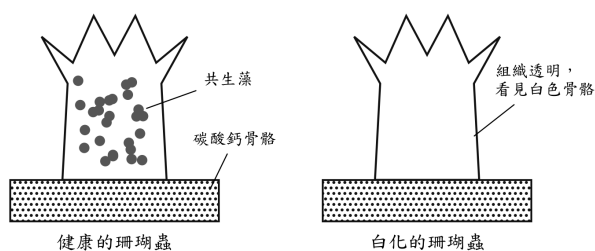
- () 1. Which new study could best test Kevin's finding and Amy's idea at the same time?
- (A) Compare students who watch music videos for different lengths of time.
 - (B) Compare students who use screens for the same amount of time but for different things.
 - (C) Group students by both screen time and screen use, then compare sleep.
 - (D) Repeat the survey at another school to see if the pattern is the same.
- () 2. On average, about how much less did the 120 students sleep than the least amount the sleep doctors say teens need?
- (A) About 0.7 hours.
 - (B) About 0.8 hours.
 - (C) About 1.0 hour.
 - (D) About 1.7 hours.
- () 3. Forty students keep sleep diaries. On 200 nights they used phones in bed: on 46, they could not fall asleep first and then picked up their phones; on 118, they used phones first and then could not fall asleep. Which of Ms. Lin's ideas do the diaries support better, and why?
- (A) The second idea, because on 46 nights the phone came after not sleeping.
 - (B) Both ideas equally, because both kinds of nights show up in the diaries.
 - (C) The first idea, because the chart links more screen time to less sleep.
 - (D) The first idea, because "phone first" nights were over twice as common.
- () 4. The test starts right after the final exams, so students may sleep longer just because the exams are over. Which plan would best test whether extra sleep comes from having no phones?
- (A) Randomly split 60 students into two groups; only one group gives up phones.
 - (B) Compare the 30 students' sleep before the exams with their sleep after.
 - (C) Ask 60 students instead of 30 to leave their phones outside.
 - (D) Run the test for four weeks instead of two, so the exam effect fades.
- () 5. The class collects some new data. Which set of data would best support Amy's idea?
- (A) Music videos for 90 min: 7.8 h of sleep; social media for 90 min: 6.3 h
 - (B) Music videos for 20 min: 7.8 h of sleep; social media for 90 min: 6.3 h
 - (C) Social media for 20 min: 7.6 h of sleep; social media for 90 min: 6.2 h
 - (D) Music videos for 90 min: 7.8 h of sleep; most say the videos relax them

海洋熱浪下的珊瑚

閱讀下列短文後，回答 1～5 題。

2025 年 4 月，美國國家海洋暨大氣總署（NOAA）指出：自 2023 年開始的第四次全球珊瑚白化事件，是有紀錄以來規模最大的一次，全球約 84% 的珊瑚礁面積都曾承受足以引發白化的高溫。這個數字指的是「承受白化等級的熱壓力」，並不代表 84% 的珊瑚都已經白化。

造礁珊瑚的體內住著共生藻。共生藻行光合作用，提供珊瑚大部分所需的養分，也讓珊瑚呈現各種顏色。海水溫度持續偏高時，共生藻會受損，珊瑚便把它們排出體外。失去共生藻的珊瑚組織近乎透明，透出底下白色的碳酸鈣骨骼，這就是「白化」，如圖(一)。白化的珊瑚並沒有立刻死亡：若高溫很快退去，共生藻還有機會重新進駐；若高溫持續太久，珊瑚會因長期缺乏養分而死亡。

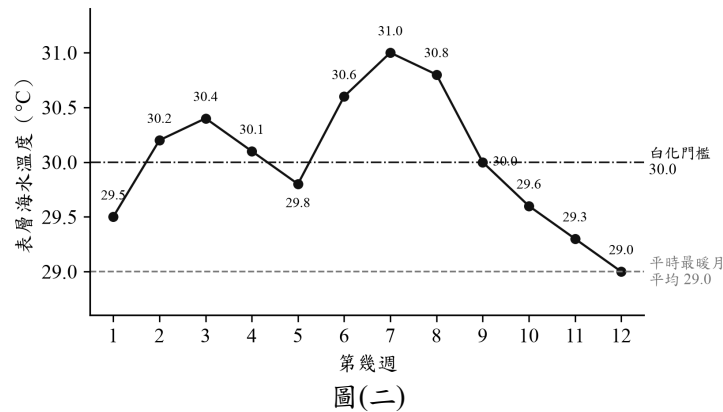


圖(一) 示意圖，比例未依實物

科學家怎麼判斷一片珊瑚礁受到多大的熱壓力？NOAA 以當地「平時最暖月的平均水溫」為基準，某一週的水溫高出基準 1°C 以上，才把這一週「高出基準的度數」計入；把過去 12 週計入的度數加總，就是累計熱壓力（NOAA 實際以逐日水溫計算，本文簡化為週平均），單位為「 $^{\circ}\text{C}\cdot\text{週}$ 」。累計熱壓力與可能情況如表(一)。圖(二)為某珊瑚礁連續 12 週的週平均表層水溫（示意數據），該地平時最暖月的平均水溫為 29.0°C 。

累計熱壓力 ($^{\circ}\text{C}\cdot\text{週}$)	可能出現的情況
未達 4	珊瑚承受壓力
4 以上、未達 8	明顯白化
8 以上	嚴重白化，可能有大量珊瑚死亡

表(一)



- () 1. 根據本文，關於「84%」這個數字，下列解讀何者正確？
- (A) 全球 84% 的珊瑚已經死亡
(B) 全球約 84% 的珊瑚礁面積曾承受足以引發白化的高溫
(C) 全球 84% 的珊瑚都已經白化
(D) 全球 84% 的珊瑚礁水溫比前一年高 1 °C
- () 2. 白化的珊瑚看起來是白色，主要原因是下列何者？
- (A) 骨骼被高溫曬成白色 (B) 共生藻把顏色分解掉
(C) 排出共生藻，透出白色骨骼 (D) 骨骼溶解成白色粉末
- () 3. 依本文的計算方法與圖(二)，這片珊瑚礁 12 週的累計熱壓力約為多少？最可能出現的情況為何？
- (A) 7 °C·週；明顯白化 (B) 10.1 °C·週；嚴重白化
(C) 12.3 °C·週；嚴重白化 (D) 2.0 °C·週；珊瑚承受壓力
- () 4. 阿凱說：「第 12 週水溫已經回到 29.0 °C，所以這片珊瑚礁的珊瑚已經恢復健康。」下列評論何者最恰當？
- (A) 正確，水溫回到基準就代表共生藻已經回到珊瑚體內
(B) 錯誤，水溫回到基準後珊瑚一定會死亡
(C) 正確，因為最後一週的水溫並未高出基準
(D) 不一定；水溫回落只代表熱壓力停止累計，珊瑚可能仍處於白化，甚至已有部分死亡，需實地調查才能確定
- () 5. 乙地珊瑚礁平時最暖月的平均水溫為 28.0 °C，丙地為 30.5 °C。若兩地某一週的水溫都是 30.0 °C，依本文的計算方法，下列敘述何者正確？
- (A) 只有乙地計入 2.0 °C·週 (B) 兩地計入的熱壓力相同
(C) 丙地基準較高，計入的較多 (D) 兩地這一週都不計入

When the Sea Gets Too Warm

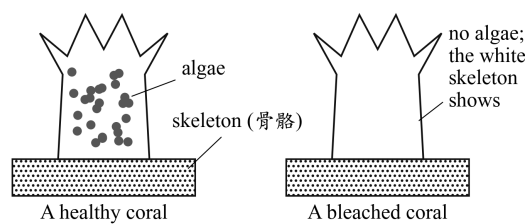
Read the passage and the notice, and answer questions 1–5.

From 2023 to 2025, the world saw its largest coral bleaching event on record. Scientists at NOAA, a U.S. ocean agency, say about 84% of the world's coral reefs felt heat strong enough to cause bleaching.

Corals may look like rocks, but they are animals, and tiny algae (藻類) live inside them.

The algae make food from sunlight for the corals and give many of them their colors. When the water stays too warm for too long, the algae get hurt, and the corals push them out.

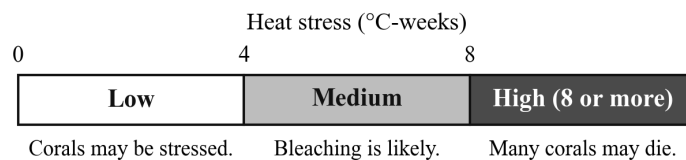
Without the algae, the corals turn white, and this is called bleaching.



Picture: A healthy coral and a bleached coral

A white coral is not dead yet, because the algae can come back if the water cools down soon. If the heat goes on for too long, however, the coral may starve and die. This is bad news for the whole sea. Coral reefs cover less than 1% of the ocean floor, but scientists think they are home to about a quarter of all known kinds of sea life.

Scientists cannot dive to every reef, so NOAA uses satellites (人造衛星) to check the temperature of the sea surface every day. To warn people before it is too late, they measure heat stress in “°C-weeks.” For example, if the water stays 2 °C above a reef's safe limit for 3 weeks, the reef gets 6 °C-weeks. The chart below shows a simple guide to what different numbers mean.



Simplified from NOAA alert levels. 1 °C-week = water 1 °C above the safe limit for 1 week

Chart: Coral heat stress levels

Blue Bay Diving Club: Volunteers Wanted

We need divers next Saturday, after one more warm week. We will go to the reef where, by then, bleaching is likely but heat stress is still below 8 °C-weeks.

Reef	Heat stress this week	Expected next week
Turtle Reef	3 °C-weeks	2 °C above safe limit
Rainbow Reef	7 °C-weeks	2 °C above safe limit
Sunset Reef	5 °C-weeks	3 °C above safe limit

- () 1. A bleached coral gets its algae back but still looks white. Which idea in the reading does this call into doubt the most?
- (A) Corals push out their algae when the water stays too warm.
 (B) Corals get many of their colors from the algae inside them.
 (C) The algae can come back if the water cools down soon.
 (D) Corals may starve if they live without algae for too long.
- () 2. Most corals at Reef P and Reef Q are white, and both reached 5 °C-weeks over the last few weeks. Reef P's water is now below its safe limit; Reef Q's will likely stay 2 °C above it for 3 more weeks. White corals are not always dead. Which conclusion is most reasonable?
- (A) The risk is the same, as both are at 5 °C-weeks now.
 (B) Reef P's corals face more risk, as fast cooling may shock weak corals.
 (C) Reef Q's corals face more risk, as it should reach only about 6 °C-weeks.
 (D) Reef Q's corals face more risk, as it may reach about 11 °C-weeks.
- () 3. In a lab, bleached corals stay in the same warm water, but only some get extra food each day. Based on the reading, what would most likely happen to the fed corals?
- (A) Their colors would come back sooner, as food helps the algae return.
 (B) They would live about as long as the unfed ones, as the water is still warm.
 (C) They might stay alive longer while white, as they would not starve so soon.
 (D) They would turn white more slowly, as fed corals keep their algae longer.
- () 4. A reef was 2 °C over its safe limit for two weeks, then 3 °C over for one. By the chart, what is its heat stress now, and how much more puts it at High?
- (A) 7 °C-weeks now; at least 1 more (B) 9 °C-weeks now; already at High
 (C) 6 °C-weeks now; at least 2 more (D) 5 °C-weeks now; at least 3 more
- () 5. Read the notice. Where will the divers go next Saturday?
- (A) Turtle Reef. (B) Rainbow Reef. (C) Sunset Reef. (D) None of them.