2004 Q12

12. Niki usually leaves her cell phone on. If her cell phone is on but she is not actually using it, the battery will last for 24 hours. If she is using it constantly, the battery will last for only 3 hours. Since the last recharge, her phone has been on 9 hours, and during that time she has used it for 60 minutes. If she doesn't talk any more but leaves the phone on, how many more hours will the battery last?

(A) 7 **(B)** 8 **(C)** 11 **(D)** 14 **(E)** 15

12. **(B)** The phone has been used for 60 minutes, or 1 hour, to talk, during which time it has used $\frac{1}{3}$ of the battery. In addition, the phone has been on for 8 hours without talking, which used an additional $\frac{8}{24}$ or $\frac{1}{3}$ of the battery. Consequently, $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$ of the battery has been used, meaning that $\frac{1}{3}$ of the battery, or $\frac{1}{3}\times 24 = 8$ hours remain if Niki does not talk on her phone.

OR

Niki's battery has 24 hours of potential battery life. By talking for one hour, she uses $\frac{1}{3}\times 24 = 8$ hours of battery life. In addition, the phone is left on and unused for 8 hours, using an additional 8 hours. This leaves $24-8-8=8$ hours of battery life if the phone is on and unused.

2002 Q18

18. Gage skated 1 hr 15 min each day for 5 days and 1 hr 30 min each day for 3 days. How long would he have to skate the ninth day in order to average 85 minutes of skating each day for the entire time?

(A) 1 hr **(B)** 1 hr 10 min **(C)** 1 hr 20 min **(D)** 1 hr 40 min **(E)** 2 hr

18. **(E)** In 5 days, Gage skated for $5 \times 75 = 375$ minutes, and in 3 days he skated for $3 \times 90 = 270$ minutes. So, in 8 days he skated for $375 + 270 = 645$ minutes. To average 85 minutes per day for 9 days he must skate $9 \times 85 = 765$ minutes, so he must skate $765 - 645 = 120$ minutes $= 2$ hours the ninth day.

OR

For 5 days Gage skated 10 minutes under his desired average, and for 3 days he skated 5 minutes over his desired average. So, on the ninth day he needs to make up $5 \times 10 - 3 \times 5 = 50 - 15 = 35$ minutes. To do this, on the ninth day he must skate for $85 + 35 = 120$ minutes $= 2$ hours.

2003 Q20

20. What is the measure of the acute angle formed by the hands of a clock at 4:20 a.m.?

(A) $0°$ **(B)** $5°$ **(C)** $8°$ **(D)** $10°$ **(E)** $12°$

20. **(D)** Note that in the same period of time, the hour hand moves $\frac{1}{12}$ as far as the minute hand. At 4:00 a.m., the minute hand is at 12 and the hour hand is at 4. By 4:20 a.m., the minute hand has moved $\frac{1}{3}$ of way around the clock to 4, and the hour hand has moved $\frac{1}{12} \times \frac{1}{3} = \frac{1}{36}$ of the way around the clock from 4. Therefore, the angle formed by the hands at 4:20 a.m. is $\frac{1}{36} \cdot 360° = 10°$.

OR

As the minute hand moves $\frac{1}{3}$ of the way around the clock face from 12 to 4, the hour hand will move $\frac{1}{3}$ of the way from 4 to 5. So the hour hand will move $\frac{1}{3}$ of $\frac{1}{12}$ of $360°$, or $10°$.

1985 Q20

20. In a certain year, January had exactly four Tuesdays and four Saturdays. On what day did January 1 fall that year?

A) Monday B) Tuesday C) Wednesday D) Friday E) Saturday

20. (C) January has 31 days. Had January 1 fallen on a Monday or Tuesday, then there would have been five Tuesdays - 2, 9, 16, 23, 30 or 1, 8, 15, 22, 29. Likewise, had January 1 fallen on a Friday or Saturday, there would have been five Saturdays. Thus (C) is correct.