1. An accurate clock shows 8 o'clock in the morning. Through how may degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

A. 154°

B. 180°

C. 170°

D. 160°

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

We know that Angle traced by hour hand in 12 hrs = 360°

From 8 to 2, there are 6 hours

The angle traced by the hour hand in 6 hours $= 6 \times \frac{360}{12} = 180°$

2. A clock is started at noon. By 10 minutes past 5, the hour hand has turned through

A. 155°

B. 145°

C. 152°

D. 140°

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

We know that Angle traced by hour hand in 12 hrs = 360°

Time duration from noon to 10 minutes past 5 = 5 hours 10 minutes

$= 5\frac{10}{60}$ hour $= \frac{31}{6}$ hours

Hence the angle traced by hour hand from noon to 10 minutes past 5 =

$\frac{31}{6} \times \frac{360}{12} = \frac{31}{6} \times 30 = 31 \times 5 = 155°$

3. At what time between 7 and 8 o'clock will the hands of a clock be in the same straight line but, not together?

A. 5 minutes past 7

B. $5\frac{3}{11}$ miinutes past 7

C. $5\frac{1}{11}$ minutes past 7

D. $5\frac{5}{11}$ minutes past 7

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The two hands of a clock will be in the same straight line but not together between H and (H + 1) o' clock at

- $(5H - 30)\frac{12}{11}$ minutes past H, when H > 6
- $(5H + 30)\frac{12}{11}$ minutes past H, when H <6

Here H = 7. Hands of the clock will point in opposite directions at

$(5 \times 7 - 30)\frac{12}{11}$ minutes past 7

$= \frac{5 \times 12}{11}$ minutes past 7 $= \frac{60}{11}$ minutes past 7 $= 5\frac{5}{11}$ minutes past 7

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

If the hands of the clock are in the same straight line, but not together, they will be 30 minutes apart.

At 7'o clock, the hands of the clock are 25 minutes apart.Hence the minute hand should gain 5 minutes so that the hands will be 30 minutes apart

We know that, in 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.

Hence to gain 5 minutes for the minute hand, time needed $= \frac{60}{55} \times 5$

$= \frac{60}{11}$ minutes $= 5\frac{5}{11}$ minutes

That means when the time is $5\frac{5}{11}$ minutes past 7, the hands of a clock will be in the same straight line but, not together

4. At what time between 5.30 and 6 will the hands of a clock be at right angles?

A. 44 minutes past 5

B. $44\frac{7}{11}$ minutes past 5

C. $43\frac{7}{11}$ minutes past 5

D. 43 minutes past 5

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

The two hands of the clock will be at right angles between H and (H + 1) o' clock at $(5H \pm 15)\frac{12}{11}$ minutes past H 'o clock

Let's see the times at which right angles are formed between 5 and 6

Let's take H=5. Hence the two hands will be at right angles between 5 and 6 at

$(5 \times 5 \pm 15)\frac{12}{11}$ minutes past 5 'o clock

$= (25 \pm 15)\frac{12}{11}$ minutes past 5 'o clock

$= 10 \times \frac{12}{11}$ minutes past 5 'o clock and $40 \times \frac{12}{11}$ minutes past 5 'o clock

$= \frac{120}{11}$ minutes past 5 'o clock and $\frac{480}{11}$ minutes past 5 'o clock

$= 10\frac{10}{11}$ minutes past 5 'o clock and $43\frac{7}{11}$ minutes past 5 'o clock

$10\frac{10}{11}$ minutes past 5 comes before 5.30. $43\frac{7}{11}$ minutes past 5 comes between 5.30 and 6. The question is to find out the time between 5.30 and 6 when the hands of a clock will be at right angles.Hence the time is $43\frac{7}{11}$ minutes past 5

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand

the basics for sure. Please find the method given below to solve the same problem in the traditional way.

At 5, the hands are 25 minutes spaces apart

To get a right angle when the time is between 5.30 and 6,

the minute hand has to gain (25 + 15) = 40 minutes

We know that, in 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.

Hence to gain 40 minutes for the minute hand, time needed $= \frac{60}{55} \times 40$

$= \frac{12}{11} \times 40 = \frac{480}{11} = 43\frac{7}{11}$ minutes

That means when the time is $43\frac{7}{11}$ minutes past 5, the hands of a clock will be at right angles

5. At what angle the hands of a clock are inclined at 15 minutes past 5?

A. $67\frac{1}{2}°$

B. $62\frac{1}{2}°$

C. 70°

D. $63\frac{3}{4}°$

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$$= 30\,(H - \frac{M}{5}) + \frac{M}{2} \text{ degree}$$

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$$= 30\,(\frac{M}{5} - H) - \frac{M}{2} \text{ degree}$$

Here H = 5, M = 15 and the minute hand is behind the hour hand. Hence the angle

$$= 30\,(H - \frac{M}{5}) + \frac{M}{2} = 30\,(5 - \frac{15}{5}) + \frac{15}{2} = 30\,(5 - 3) + 7.5$$

$$= 30 \times 2 + 7.5 = 67.5°$$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

15 minutes past 5 = 5 hour 15 minutes = $5\,\frac{15}{60}$ hour = $5\,\frac{1}{4}$ hour = $\frac{21}{4}$ hour

Angle traced by hour hand in 12 hours = 360°

Hence Angle traced by hour hand in $\frac{21}{4}$ hour = $\frac{360}{12} \times \frac{21}{4}$

$$= 30 \times \frac{21}{4} = 30 \times 5.25 = 157.5°$$

Angle traced by minute hand in 60 minutes = 360°

Angle traced by minute hand in 15 minutes = $\frac{360}{60} \times 15 = 90°$

Required angle = 157.5 - 90 = 67.5°

6. At 3.40, the hour hand and the minute hand of a clock form an angle of

A. 135°
B. 130°
C. 120°
D. 125°

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$$= 30\,(H - \frac{M}{5}) + \frac{M}{2} \text{ degree}$$

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$$= 30\,(\frac{M}{5} - H) - \frac{M}{2} \text{ degree}$$

Here H = 3, M = 40 and minute hand is ahead of the hour hand. Hence the angle

$$= 30\,(\frac{M}{5} - H) - \frac{M}{2} = 30\,(\frac{40}{5} - 3) - \frac{40}{2} = 30\,(8 - 3) - 20$$

$$= 30 \times 5 - 20 = 130°$$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

$$3.40 = 3 \text{ hour } 40 \text{ minutes} = 3\,\frac{40}{60} \text{ hour} = 3\,\frac{2}{3} \text{ hour} = \frac{11}{3} \text{ hour}$$

Angle traced by hour hand in 12 hours = 360°

Hence Angle traced by hour hand in $\frac{11}{3}$ hour $= \frac{360}{12} \times \frac{11}{3}$

$= 30 \times \frac{11}{3} = 10 \times 11 = 110°$

Angle traced by minute hand in 60 minutes = 360°

Angle traced by minute hand in 40 minutes $= \frac{360}{60} \times 40 = 240°$

Required angle = 240 - 110= 130°

7. The angle between the minute hand and the hour hand of a clock when the time is 8.30, is

A. 75°

B. 85°

C. 80°

D. 70°

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(H - \frac{M}{5}) + \frac{M}{2}$ degree

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\frac{M}{5} - H) - \frac{M}{2}$ degree

Here H = 8, M = 30 and minute hand is behind the hour hand. Hence the angle

$= 30\,(H - \frac{M}{5}) + \frac{M}{2} = 30\,(8 - \frac{30}{5}) + \frac{30}{2} = 30\,(8 - 6) + 15$

$= 30 \times 2 + 15 = 75°$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand

the basics for sure. Please find the method given below to solve the same problem in the traditional way.

$8.30 = 8 \text{ hour } 30 \text{ minutes} = 8\frac{1}{2} \text{ hour} = \frac{17}{2} \text{ hour}$

Angle traced by hour hand in 12 hours = 360°

$\text{Hence Angle traced by hour hand in } \frac{17}{7} \text{ hour} = \frac{360}{12} \times \frac{17}{2}$

$= 30 \times \frac{17}{2} = 15 \times 17 = 255°$

Angle traced by minute hand in 60 minutes = 360°

$\text{Angle traced by minute hand in 30 minutes} = \frac{360}{60} \times 30 = 180°$

Required angle = 255- 180= 75°

8. How many times in a day, are the hands of a clock in straight line but opposite in direction?

A. 48
B. 22
C. 24
D. 12

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Here is the answer and explanation

Answer : Option B

Explanation :

The hands of a clock point in opposite directions (in the same straight line, making an angle 180° between them) 11 times in every 12 hours because between 5 and 7 they point in opposite directions at 6 'o clock only.

Hence the hands point in the opposite directions 22 times in a day

However this is already given as a formula and its is better to by heart the answer as 22

which can save time in competitive exams.(However if you should know the theory behind)

9. At what time between 3 o'clock and 4 o'clock, both the needles of a clock will coincide each other?

A. $16\frac{2}{11}$ minutes past 3

B. $16\frac{4}{11}$ minutes past 3

C. $15\frac{4}{11}$ minutes past 3

D. $15\frac{2}{11}$ minutes past 3

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The two hands of a clock will be together between H and (H+1) o' clock at $(\frac{60H}{11})$ minutes past H o' clock.

Here H = 3. Hands will be together at $\frac{60H}{11}$ minutes past 3

$= \frac{60 \times 3}{11}$ minutes past 3

$= \frac{180}{11}$ minutes past $3 = 16\frac{4}{11}$ minutes past 3

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

At 3 o' clock, the hands are 15 minute spaces apart

Hence minute hand needs to gain 15 more minute spaces so that the hands will coincide each other

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 15 minute spaces by minute hand

$= \frac{60}{55} \times 15$ minute $= \frac{12}{11} \times 15$ minute $= \frac{180}{11}$ minute $= 16\frac{4}{11}$ minute

Hence hands will will coincide at $16\frac{4}{11}$ minute past 3

10. How many times will the hands of a clock coincide in a day?

A. 24 B. 22

C. 20 D. 21

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The hands of a clock coincide 11 times in every 12 hours (Between 11 and 1, they coincide

only once, at 12 o'clock).

12:00 am

1:05 am

2:11 am

3:16 am

4:22 am

5:27 am

6:33 am

7:38 am

8:44 am

9:49 am

10:55 am

12:00 pm

1:05 pm

2:11 pm

3:16 pm

4:22 pm

5:27 pm

6:33 pm

7:38 pm

8:44 pm

9:49 pm

10:55 pm

Hence the hands coincide 22 times in a day.

However this is already given as a formula and its is better to by heart the answer as 22

which can save time in competitive exams.(However if you should know the theory behind)

11. How many times in a day, the hands of a clock are straight

A. 22 B. 44

C. 48 D. 24

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The hands of a clock point in opposite directions (in the same straight line, making an angle 180° between them) 11 times in every 12 hours because between 5 and 7 they point in opposite directions at 6 'o clock only. Hence the hands point in the opposite directions 22 times in a day

The hands of a clock coincide(0 ° between them) 11 times in every 12 hours (Between 11 and 1, they coincide only once, at 12 o'clock). Hence the hands coincide 22 times
in a day.

So In 24 hours, the hands come in opposite direction or coincide 44 times .

However this is already given as a formula and its is better to by heart the answer as 44
which can save time in competitive exams.(However if you should know the theory behind)

12. How much does a watch lose per day, if its hands coincide every 64 minutes?

A. $34\frac{1}{11}$ minute B. $32\frac{8}{11}$ minute

C. 31 minute D. $33\frac{2}{11}$ minute

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Here is the answer and explanation

Answer : Option B

Explanation :

The minute hand of a clock overtakes the hour hand at intervals of M minutes of correct time. The clock gains or loses in a day by

$$= (\frac{720}{11} - M)\ (\frac{60 \times 24}{M})\ \text{minutes}$$

Here M = 64. The clock gains or losses in a day by

$$= (\frac{720}{11} - M)\ (\frac{60 \times 24}{M}) = (\frac{720}{11} - 64)\ (\frac{60 \times 24}{64}) = \frac{16}{11}\ (\frac{60 \times 3}{8})$$

$$= \frac{2}{11}\ (60 \times 3) = \frac{360}{11} = 32\ \frac{8}{11}\ \text{minutes}$$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

=> Time taken by the minute hand to gain 60 min spaces in a normal clock =

$$\frac{60}{55} \times 60 = \frac{12}{11} \times 60 = \frac{720}{11} = 65\ \frac{5}{11}\ \text{min}$$

In the given watch, hands coincide every 64 minutes. In another words, minute hand gains 60 min spaces in every 64 minutes for the given watch.

$$\text{Loss in 64 min} = 65\ \frac{5}{11} - 64 = 1\ \frac{5}{11} = \frac{16}{11}\ \text{minute}$$

$$\text{Loss in 24 hours} = \frac{16}{11} \times \frac{1}{64} \times 24 \times 60 = \frac{1}{11} \times \frac{1}{4} \times 24 \times 60 = \frac{360}{11} = 32\ \frac{8}{11}\ \text{minute}$$

13. At what time between 9 and 10 o' clock will the hands of a clock be together?

A. $45\ \frac{2}{9}$ min past 9

B. $49\ \frac{1}{11}$ min past 9

C. $48\ \frac{1}{12}$ min past 9

D. $47\ \frac{2}{15}$ min past 9

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

The two hands of a clock will be together between H and (H+1) o' clock at $(\frac{60H}{11})$ minutes past H o' clock.

Here H = 9. Hands will be together at $\frac{60 \times 9}{11}$ minutes past 9

$= \frac{540}{11}$ minutes past $9 = 49\ \frac{1}{11}$ minutes past 9

Solution 2

Its better to use formula as it can save lots of time in exams. However its better to understand the basics. Please find the method given below to solve the same problem in the traditional way.

At 9 o' clock, the hands are 45 minute spaces apart

Hence minute hand needs to gain 45 more minute spaces so that the hands will coincide each other?

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 45 minute spaces by minute hand

$= \frac{60}{55} \times 45$ minute $= \frac{12}{11} \times 45$ minute $= \frac{540}{11}$ minute $= 49\ \frac{1}{11}$ minute

Hence hands will coincide at $49\ \frac{1}{11}$ minute past 9

14. At what time between 4 and 5 o'clock will the hands of a watch point in opposite directions?

A. $53\ \frac{6}{11}$ minutes past 4

B. $53\ \frac{7}{11}$ minutes past 4

C. $54\ \frac{6}{11}$ minutes past 4

D. $54\ \frac{7}{11}$ minutes past 4

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

The two hands of a clock will be in the same straight line but not together between H and (H + 1) o' clock at

- $(5H - 30)\frac{12}{11}$ minutes past H, when $H > 6$
- $(5H + 30)\frac{12}{11}$ minutes past H, when $H < 6$

Here H = 4. Hands of the watch will point in opposite directions at $(5 \times 4 + 30)\frac{12}{11}$ minutes past 4

$= \frac{50 \times 12}{11}$ minutes past $4 = \frac{600}{11}$ minutes past 4

$= 54\frac{6}{11}$ minutes past 4

Solution 2

Its better to use formula as it can save lots of time in exams. However its better to understand the basics. Please find the method given below to solve the same problem in the traditional way.

At 4 o' clock, the hands are 20 minute spaces apart

Hence minute hand needs to gain 50 more minute spaces so that the hands will point in opposite directions.

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 50 minute spaces by minute hand

$= \frac{60}{55} \times 50$ minute $= \frac{12}{11} \times 50$ minute $= \frac{600}{11}$ minute $= 54\frac{6}{11}$ minute

Hence hands will point in opposite directions at $54\frac{6}{11}$ minute past 4

15. A watch which gains 5 seconds in 3 minutes was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 o'clock, the true time is

A. 3 pm
B. 3.45 pm
C. 3.30 pm
D. 4 pm

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Here is the answer and explanation

Answer : Option D

Explanation :

Time from 7 am to 4.15 pm = 9 hours 15 minutes = $9\frac{1}{4}$ hours = $\frac{37}{4}$ hours

3 minute 5 seconds of the given clock = 3 minutes of a normal clock

$\Rightarrow 3\frac{1}{12}$ minutes of the given clock = 3 minutes of a normal clock

$\Rightarrow \frac{37}{12}$ minutes of the given clock = 3 minutes of a normal clock

$\Rightarrow \frac{37}{720}$ hours of the given clock = $\frac{3}{60}$ hours of a normal clock

$\Rightarrow \frac{37}{720}$ hours of the given clock = $\frac{1}{20}$ hours of a normal clock

$\Rightarrow \frac{37}{4}$ hours of the given clock = $\frac{1}{20} \times \frac{720}{37} \times \frac{37}{4}$ hours of the given clock

= 9 hours of the given clock

Hence the correct time = 9 hours after 7 am = 4 pm

16. How many times are the hands of a clock at right angle in a day?

A. 48
B. 44
C. 24
D. 22

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

In 12 hours, hands of a clock are at right angles at 22 times.

In 24 hours, hands of a clock are at right angles at 44 times.

17. A watch which gains uniformly is 2 minutes low at noon on and is 4 min 48 sec fast at 2 pm on the following Monday. When was it correct?

A. 2 pm on Tuesday

B. 3 pm on Wednesday

C. 2 pm on Wednesday

D. 3 pm on Tuesday

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option C

Explanation :

Time from Monday noon (12 o' clock) to following Monday 2 pm = 7 day 2 hours

$= 7 \times 24 + 2 = 168 + 2 = 170 \text{ hours}$

Total time gained Monday noon (12 o' clock) to following Monday 2 pm = 2 min + 4 min 48 sec

$= 6 \text{ min } 48 \text{ sec} = 6\frac{48}{60} \text{ mins} = 6\frac{4}{5} \text{ mins} = \frac{34}{5} \text{ mins}$

$\Rightarrow$ The given watch gains $\frac{34}{5}$ mins in 170 hours

Given that the said watch was 2 minutes low at Monday noon. Hence when it gained 2 minutes,

the time was correct.

The given watch gains $\frac{34}{5}$ mins in 170 hours

$\Rightarrow$ The given watch gains 2 mins in $170 \times \frac{5}{34} \times 2$ hours

$= 5 \times 5 \times 2 \text{ hours} = 50 \text{ hours}$

Hence the time was correct after 50 hours from Monday noon

= after 2 days 2 hours from Monday noon = 2 pm on Wednesday

18. What is the reflex angle between the hands of a clock at 10.25?

A. $195°$

B. $197\frac{1}{2}°$

C. $180°$

D. $193\frac{1}{2}°$

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option B

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\mathrm{H} - \frac{\mathrm{M}}{5}) + \frac{\mathrm{M}}{2}$ degree

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\frac{\mathrm{M}}{5} - \mathrm{H}) - \frac{\mathrm{M}}{2}$ degree

Here H = 10 , M = 25 and the minute hand is behind the hour hand. Hence the angle

$$= 30\,(\mathrm{H} - \frac{\mathrm{M}}{5}) + \frac{\mathrm{M}}{2} = 30\,(10 - \frac{25}{5}) + \frac{25}{2} = 30\,(10 - 5) + 12.5$$

$$= 30 \times 5 + 12.5 = 150 + 12.5 = 162.5°$$

But the question is to find out the reflex angle.

Reflex angle = 360 - 162.5 = 197.5 °

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

$$10 \text{ hour } 25 \text{ minutes} = 10\,\frac{25}{60} \text{ hour} = 10\,\frac{5}{12} \text{ hour} = \frac{125}{12} \text{ hour}$$

Angle traced by hour hand in 12 hrs = 360°

$$\text{Angle traced by hour hand in } \frac{125}{12} \text{ hour} = \frac{360}{12} \times \frac{125}{12} = 30 \times \frac{125}{12}$$

$$= 10 \times \frac{125}{4} = 10 \times 31.25 = 312.5°$$

Angle traced by minute hand in 60 min. = 360°.

Angle traced by minute hand in 25 min. $= \frac{360}{60} \times 25 = 6 \times 25 = 150°$.

Angle between the hands of the clock when the time is 10.25 = 312.5 ° -150 ° =162.5 °.

Reflex angle = 360 - 162.5 = 197.5 °

19. The angle between the minute hand and the hour hand of a clock when the time is 4.20 is

A. 10°

B. 5°

C. 0°

D. 1°

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(H - \frac{M}{5}) + \frac{M}{2}$ degree

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\frac{M}{5} - H) - \frac{M}{2}$ degree

Here H = 4, M = 20 the minute hand is slightly behind the hour hand. Hence the angle

$= 30\,(H - \frac{M}{5}) + \frac{M}{2} = 30\,(4 - \frac{20}{5}) + \frac{20}{2} = 30\,(4 - 4) + 10$

$= 30 \times 0 + 10 = 10°$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand

the basics for sure. Please find the method given below to solve the same problem in

the traditional way.

$$4 \text{ hour } 20 \text{ minutes} = 4\frac{1}{3} \text{ hour} = \frac{13}{3} \text{ hour}$$

Angle traced by hour hand in 12 hrs = 360°

$$\text{Angle traced by hour hand in } \frac{13}{3} \text{ hour} = \frac{360}{12} \times \frac{13}{3} = 30 \times \frac{13}{3}$$

$$= 10 \times 13 = 130°$$

Angle traced by minute hand in 60 min. = 360°.

$$\text{Angle traced by minute hand in 20 min.} = \frac{360}{60} \times 20 = 6 \times 20 = 120°.$$

Angle between the hands of the clock when the time is 4.20 = 130° - 120° =10°.

20. A clock is set at 5 am. If the clock loses 16 minutes in 24 hours, what will be the true time when the clock indicates 10 pm on 4th day?

A. 9.30 pm

B. 10 pm

C. 10.30 pm

D. 11 pm

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Here is the answer and explanation

Answer : Option D

Explanation :

Time from 5 am to 10 pm on the 4th day = 3 days 17 hours = $3 \times 24 + 17 = 89$ hours

Given that clock loses 16 minutes in 24 hours

$\Rightarrow>$ 23 hour 44 minutes of the given clock = 24 hours in a normal clock

$\Rightarrow 23\frac{44}{60}$ hours of the given clock = 24 hours in a normal clock

$\Rightarrow 23\frac{11}{15}$ hours of the given clock = 24 hours in a normal clock

$\Rightarrow \frac{356}{15}$ hours of the given clock = 24 hours in a normal clock

$\Rightarrow$ 89 hours of the given clock = $24 \times \frac{15}{356} \times 89$ hours in a normal clock

$= 24 \times \frac{15}{4} = 6 \times 15 = 90$ hours

So the correct time is 90 hours after 5 am = 3 days 18 hours after 5 am = 11 pm on the 4th day

21. What is the angle between the hour and the minute hand of a clock when the time is 3.25?

A. 47

B. $46\frac{1}{2}$

C. 46

D. $47\frac{1}{2}$

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Here is the answer and explanation

Answer : Option D

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\mathrm{H} - \frac{\mathrm{M}}{5}) + \frac{\mathrm{M}}{2}$ degree

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\frac{\mathrm{M}}{5} - \mathrm{H}) - \frac{\mathrm{M}}{2}$ degree

Here H = 3, M = 25 and the minute hand is ahead of the hour hand. Hence the angle

$= 30\,(\frac{\mathrm{M}}{5} - \mathrm{H}) - \frac{\mathrm{M}}{2} = 30\,(\frac{25}{5} - 3) - \frac{25}{2} = 30\,(5 - 3) - 12.5$

$= 30 \times 2 - 12.5 = 60 - 12.5 = 47.5°$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

3 hour 25 minutes $= 3\,\frac{25}{60}$ hour $= 3\,\frac{5}{12}$ hour $= \frac{41}{12}$ hour

Angle traced by hour hand in 12 hrs = 360°

Angle traced by hour hand in $\frac{41}{12}$ hour $= \frac{360}{12} \times \frac{41}{12} = 30 \times \frac{41}{12}$

$= 10 \times \frac{41}{4} = 10 \times 10.25 = 102.5°$

Angle traced by minute hand in 60 min. = 360°.

Angle traced by minute hand in 25 min. $= \frac{360}{60} \times 25 = 6 \times 25 = 150°.$

Angle between the hands of the clock when the time is 10.25 = 150° - 102.5° = 47.5 °.

22. At what time between 8 and 9 o'clock will the hands of a clock are in the same straight line but not together?

A. $11\frac{8}{11}$ minutes past 8

B. $10\frac{8}{11}$ minutes past 8

C. $11\frac{10}{11}$ minutes past 8

D. $10\frac{10}{11}$ minutes past 8

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Here is the answer and explanation

Answer : Option D

Explanation :

The two hands of a clock will be in the same straight line but not together between H and (H + 1) o' clock at

$(5H - 30)\frac{12}{11}$ minutes past H, when $H > 6$

$(5H + 30)\frac{12}{11}$ minutes past H, when $H < 6$

Here H = 8. Hands of the clock will point in opposite directions at

$(5 \times 8 - 30)\frac{12}{11}$ minutes past 8

$= \frac{10 \times 12}{11}$ minutes past $8 = \frac{120}{11}$ minutes past $8 = 10\frac{10}{11}$ minutes past 8

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

At 8 o' clock, the hands are 20 minute spaces apart

Hence minute hand needs to gain 10 more minute spaces so that the hands will be in opposite direction

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 10 minute spaces by minute hand

$= \frac{60}{55} \times 10 \text{ minute} = \frac{12}{11} \times 10 \text{ minute} = \frac{120}{11} \text{ minute} = 10\frac{10}{11} \text{ minute}$

Hence hands will be in opposite direction at $10\frac{10}{11}$ minute past 8

23. At what time between 2 and 3 o'clock will the hands of a clock be together?

A. $9\frac{11}{11}$ minutes past 2

B. $9\frac{10}{11}$ minutes past 2

C. $10\frac{11}{11}$ minutes past 2

D. $10\frac{10}{11}$ minutes past 2

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Here is the answer and explanation

Answer : Option D

Explanation :

The two hands of a clock will be together between H and (H+1) o' clock at $(\frac{60H}{11})$ minutes past H o' clock.

Here H = 2. Hands will be together at $\frac{60 \times 2}{11}$ minutes past 2

$= \frac{120}{11}$ minutes past $2 = 10\frac{10}{11}$ minutes past 2

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

At 2 o' clock, the hands are 10 minute spaces apart

Hence minute hand needs to gain 10 more minute spaces so that the hands will be in opposite direction

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 10 minute spaces by minute hand

$= \frac{60}{55} \times 10$ minute $= \frac{12}{11} \times 10$ minute $= \frac{120}{11}$ minute $= 10\frac{10}{11}$ minute

Hence hands of the clock will be together at $10\frac{10}{11}$ minute past 2

24. At what time between 5 and 6 'o clock, will the hands of a clock be at right angle?

A. $10\frac{10}{11}$ minutes past 5 and $43\frac{7}{11}$ minutes past 5

B. $10\frac{10}{11}$ minutes past 5 and $42\frac{7}{11}$ minutes past 5

C. $10\frac{9}{11}$ minutes past 5 and $42\frac{7}{11}$ minutes past 5

D. $10\frac{9}{11}$ minutes past 5 and $42\frac{7}{11}$ minutes past 5

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option A

Explanation :

The two hands of the clock will be at right angles between H and (H + 1) o' clock at $(5H \pm 15)\frac{12}{11}$ minutes past H 'o clock

Here H=5. Hence the two hands will be at right angles between 5 and 6 at

$(5 \times 5 \pm 15)\frac{12}{11}$ minutes past 5 'o clock

$= (25 \pm 15)\frac{12}{11}$ minutes past 5 'o clock

$= 10 \times \frac{12}{11}$ minutes past 5 'o clock and $40 \times \frac{12}{11}$ minutes past 5 'o clock

$= \frac{120}{11}$ minutes past 5 'o clock and $\frac{480}{11}$ minutes past 5 'o clock

$= 10\frac{10}{11}$ minutes past 5 'o clock and $43\frac{7}{11}$ minutes past 5 'o clock

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Solution 2

Its better to use formula as it can save lots of time in exams. However its good to understand the basics. Please find the method given below to solve the same problem in the traditional way.

At 5, the hands are 25 minutes spaces apart

To get first right angle ,the minute hand has to gain 25 - 15 = 10 minutes

To get second right angle ,the minute hand has to gain 25 + 15 = 40 minutes

We know that, in 60 minutes, the minute hand gains 55 minutes on the hour on the hour hand.

To gain 10 minutes for the minute hand, time needed = $\frac{60}{55} \times 10$

$= \frac{12}{11} \times 10 = \frac{120}{11} = 10\frac{10}{11}$ minutes

HTo gain 40 minutes for the minute hand, time needed = $\frac{60}{55} \times 40$

$= \frac{12}{11} \times 40 = \frac{480}{11} = 43\frac{7}{11}$ minutes

That means when the time is $10\frac{10}{11}$ minutes past 5 and $43\frac{7}{11}$ minutes past 5,

the hands of a clock will be at right angles

25. The minute hand of a clock overtakes the hour hand at intervals of 65 minutes. How much a day does the clock gain or loss?

A. $10\frac{9}{143}$ minutes

B. $11\frac{9}{143}$ minutes

C. $11\frac{10}{143}$ minutes

D. $10\frac{10}{143}$ minutes

Hide Answer | Notebook | Discuss

Here is the answer and explanation

Answer : Option D

Explanation :

The minute hand of a clock overtakes the hour hand at intervals of M minutes of correct time. The clock gains or loses in a day by

$= (\frac{720}{11} - M)\ (\frac{60 \times 24}{M})$ minutes

Here M = 65. The clock gains or losses in a day by

$= (\frac{720}{11} - M)\ (\frac{60 \times 24}{M}) = (\frac{720}{11} - 65)\ (\frac{60 \times 24}{65}) = \frac{5}{11}\ (\frac{12 \times 24}{13})$

$= \frac{1440}{143} = 10\frac{10}{143}$ minutes

26. Find the time between 4 and 5'o clock, when the two hands of a clock are 4 minutes apart?

A. $26\frac{2}{11}$ minutes past 4 and $17\frac{5}{11}$ minutes past 4

B. $26\frac{1}{11}$ minutes past 4 and $17\frac{5}{11}$ minutes past 4

C. $26\frac{2}{11}$ minutes past 4 and $17\frac{4}{11}$ minutes past 4

D. $26\frac{1}{11}$ minutes past 4 and $17\frac{4}{11}$ minutes past 4

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Here is the answer and explanation

Answer : Option A

Explanation :

Bbetween H and (H + 1) o' clock, the two hands of a clock are M minutes apart at $(5H \pm M)\frac{12}{11}$ minutes past H 'o clock

Here H=4 and M=4. Hence the two hands are 4 minutes apart between 4 and 5 at

$(5 \times 4 \pm 4)\frac{12}{11}$ minutes past 4 'o clock

$= (20 \pm 4)\frac{12}{11}$ minutes past 4 'o clock

$= 16 \times \frac{12}{11}$ minutes past 4 'o clock and $24 \times \frac{12}{11}$ minutes past 4 'o clock

$= \frac{192}{11}$ minutes past 4 'o clock and $\frac{288}{11}$ minutes past 4 'o clock

$= 17\frac{5}{11}$ minutes past 4 'o clock and $26\frac{2}{11}$ minutes past 4 'o clock

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Solution 2

Its better to use formula as it can save lots of time in exams. However please find

the method given below to solve the same problem in the traditional way.

At 4 o' clock, the hands are 20 minute spaces apart

To get the first 4° between the hands ,the minute hand has to gain 20 - 4 = 16 minute spaces

To get the second 4°between the hands ,the minute hand has to gain 20 + 4 = 24 minute spaces

We know that 55 min spaces are gained by minute hand (with respect to hour hand)

in 60 min

Time taken for gaining 16 minute spaces by minute hand

$$= \frac{60}{55} \times 16 \text{ minute} = \frac{12}{11} \times 16 \text{ minute} = \frac{192}{11} \text{ minute} = 17\ \frac{5}{11} \text{ minutes}$$

Time taken for gaining 24 minute spaces by minute hand

$$= \frac{60}{55} \times 24 \text{ minute} = \frac{12}{11} \times 24 \text{ minute} = \frac{288}{11} \text{ minute} = 26\ \frac{2}{11} \text{ minutes}$$

Hence hands of the clock are 4 minutes apart at $17\ \frac{5}{11}$ minutes past 4 and $26\ \frac{2}{11}$ minute past 4

27. At what time between 5 and 6 will the hands of the clock coincide?

A. $26\ \frac{2}{11}$ minutes past 5

B. $26\ \frac{3}{11}$ minutes past 5

C. $28\ \frac{3}{11}$ minutes past 5

D. $27\ \frac{3}{11}$ minutes past 5

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Here is the answer and explanation

Answer : Option D

Explanation :

The two hands of a clock will be together between H and (H+1) o' clock at $(\frac{60H}{11})$ minutes past H o' clock.

Here H = 5. Hands will be together at $\frac{60 \times 5}{11}$ minutes past 5

$$= \frac{300}{11} \text{ minutes past } 5 = 27\ \frac{3}{11} \text{ minutes past } 5$$

Solution 2

Its better to use formula as it can save lots of time in exams. However we should understand the basics for sure. Please find the method given below to solve the same problem in the traditional way.

At 5 o' clock, the hands are 25 minute spaces apart

Hence minute hand needs to gain 25 more minute spaces so that the hands will be in opposite direction

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 25 minute spaces by minute hand

$= \frac{60}{55} \times 25 \text{ minute} = \frac{12}{11} \times 25 \text{ minute} = \frac{300}{11} \text{ minute} = 27\frac{3}{11} \text{ minute}$

Hence hands of the clock will be together at $27\frac{3}{11}$ minute past 5

28. At what time between 6 and 7 will the hands be perpendicular

A. $48\frac{1}{11}$ minutes past 6 and $16\frac{4}{11}$ minutes past 6

B. 48 minutes past 6 and $16\frac{3}{11}$ minutes past 6

C. $49\frac{1}{11}$ minutes past 6 and $16\frac{4}{11}$ minutes past 6

D. $48\frac{2}{11}$ minutes past 6 and $16\frac{3}{11}$ minutes past 6

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Here is the answer and explanation

Answer : Option C

Explanation :

The two hands of the clock will be at right angles between H and (H + 1) o' clock at $(5H \pm 15)\frac{12}{11}$ minutes past H 'o clock

Here H=6. Hence the two hands will be at right angles between 6 and 7 at

$(5 \times 6 \pm 15)\ \frac{12}{11}$ minutes past 6 'o clock

$= (30 \pm 15)\ \frac{12}{11}$ minutes past 6 'o clock

$= 15 \times \frac{12}{11}$ minutes past 6 'o clock and $45 \times \frac{12}{11}$ minutes past 6 'o clock

$= \frac{180}{11}$ minutes past 6 'o clock and $\frac{540}{11}$ minutes past 6 'o clock

$= 16\ \frac{4}{11}$ minutes past 6 'o clock and $49\ \frac{1}{11}$ minutes past 6 'o clock

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Solution 2

Its better to use formula as it can save lots of time in exams. However its better to understand the basics. Please find the method given below to solve the same problem in the traditional way.

At 5 o' clock, the hands are 30 minute spaces apart

Hence minute hand needs to gain 15 more minute spaces or 45 more minute spaces so that the hands will be in right angles (90° between them)

We know that 55 min spaces are gained by minute hand (with respect to hour hand) in 60 min

Hence time taken for gaining 15 minute spaces by minute hand

$= \frac{60}{55} \times 15 = \frac{12}{11} \times 15 = \frac{180}{11}$

$= 16\ \frac{4}{11}$ minutes

Hence time taken for gaining 45 minute spaces by minute hand

$= \frac{60}{55} \times 45 = \frac{12}{11} \times 45 = \frac{540}{11}$

$= 49\ \frac{1}{11}$ minutes

Hence the hands will be perpendicular at $16\frac{4}{11}$ minutes past 6 and

$49\frac{1}{11}$ minutes past 6

29. What is the angle between the hands at 4.40?

A. 95° B. 100°

C. 120° D. 110°

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Here is the answer and explanation

Answer : Option B

Explanation :

Angle between Hands of a clock

When the minute hand is behind the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(H - \frac{M}{5}) + \frac{M}{2}$ degree

When the minute hand is ahead of the hour hand, the angle between the two hands at M minutes past H'o clock

$= 30\,(\frac{M}{5} - H) - \frac{M}{2}$ degree

Here H = 4, M = 40 the minute hand is ahead of the hour hand. Hence the angle

$= 30\,(\frac{M}{5} - H) - \frac{M}{2} = 30\,(\frac{40}{5} - 4) - \frac{40}{2} = 30\,(8 - 4) - 20$

$= 30 \times 4 - 20 = 100°$

Solution 2

Its better to use formula as it can save lots of time in exams. However its better

to understand the basics. Please find the method given below to solve the same problem

in the traditional way.

$4 \text{ hour } 40 \text{ minutes} = 4\frac{2}{3} \text{ hour} = \frac{14}{3} \text{ hour}$

Angle traced by hour hand in 12 hrs = 360°

Angle traced by hour hand in $\frac{14}{3}$ hour $= \frac{360}{12} \times \frac{14}{3} = 30 \times \frac{14}{3}$

$= 10 \times 14 = 140°$

Angle traced by minute hand in 60 min. = 360°.

Angle traced by minute hand in 40 min. $= \frac{360}{60} \times 40 = 6 \times 40 = 240°.$

Angle between the hands of the clock when the time is 4.40 = 240° - 140° =100°.

30. A clock strikes 4 taking 9 seconds. In order to strike 12 at the same rate, the time taken is

A. 33 seconds

B. 30 seconds

C. 36 seconds

D. 27 seconds

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Here is the answer and explanation

Answer : Option A

Explanation :

There are 3 intervals when the clock strikes 4
Time taken at 3 intervals = 9 seconds

Time taken for 1 interval $= \frac{9}{3} = 3$ seconds

In order to strike 12, there are 11 intervals. Hence time needed

$= 3 \times 11 = 33$ seconds