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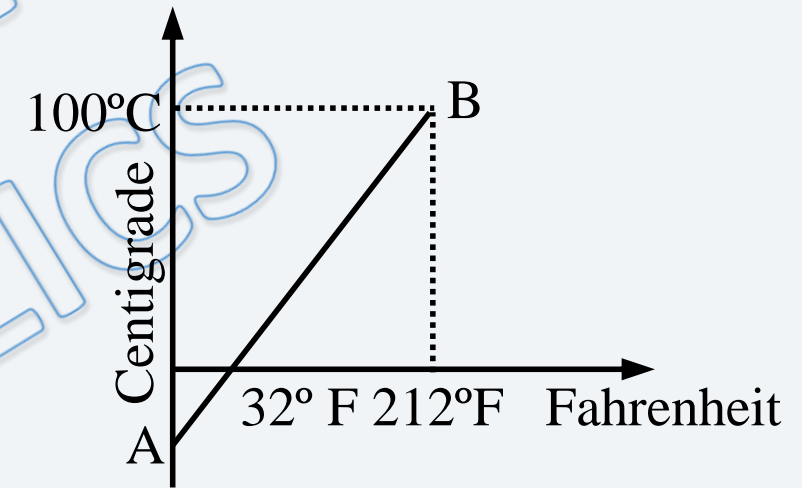https://youtu.be/jCQzHEp7lAg

Physics DPP

DPP- Thermometry

By Physicsaholics Team

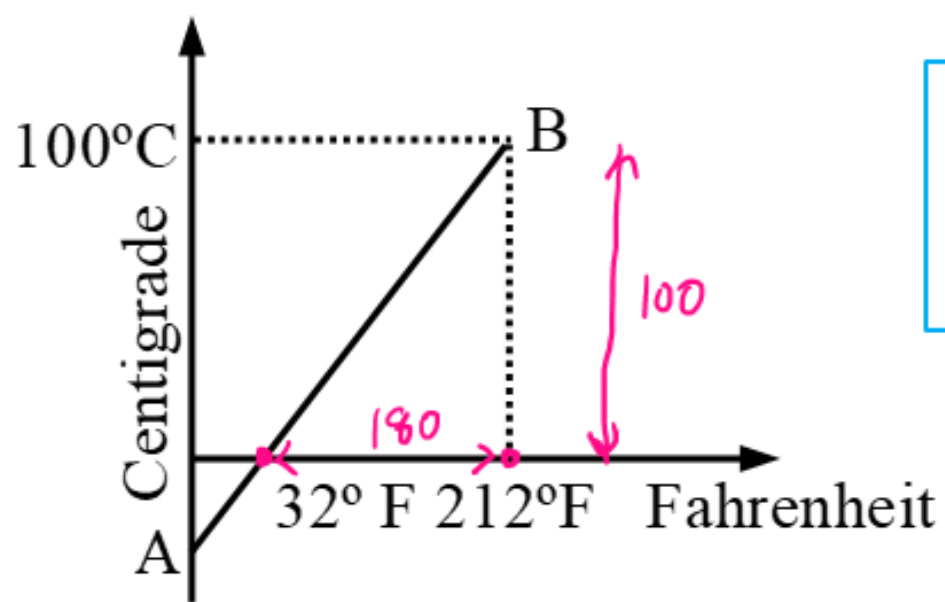Q) The graph AB shown in figure is a plot of temperature of a body in degree Celsius and degree Fahrenheit. Then -

(A) Slope of line AB is 9/5

(B) Slope of line AB is 5/9

(C) Slope of line AB is 1/9

(D) Slope of line AB is 3/9

Ans. b

100°C

Centigrade

B

100

180

32° F 212°F Fahrenheit

A

$$\tan\theta = \text{slope} = \frac{100}{180} = 5/9$$

Q) Oxygen boils at – 183°C. This temperature on Fahrenheit scale is –

(A) – 215°   (B) – 261°

(C) – 297°   (D) – 329°

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Ans. c

$$\frac{C - 0}{100 - 0} = \frac{F - 32}{212 - 32}$$

$$\frac{-183}{100} = \frac{F - 32}{180}$$

$$F = -\frac{9}{5} \times 183 + 32 = 297 \cdot 4$$

Q) The temperature of a body on Kelvin scale is found to be x K. When it is measured by Fahrenheit thermometer, it is found to be x°F, then the value of x is-

(A) 40

(B) 313

(C) 574.25

(D) 301.25

Ans. c

$$\frac{K - 273}{373 - 273} = \frac{F - 32}{212 - 32}$$

$$\frac{X - 273}{100} = \frac{X - 32}{180}$$

$$9(x - 273) = 5(x - 32)$$

$$9x - 2457 = 5x - 160$$

$$4x = 2297$$

$$x = \frac{2297}{4} = 574.25$$

Q) Ice point and steam point on a particular scale reads 10° and 80° respectively. The temperature on °F scale when temperature on new scale is 45° is -

(A) 50° F

(B) 112°F

(C) 122°F

(D) 138°F

Ans.c

$$\frac{X-10}{80-10} = \frac{F-32}{212-32}$$

$$\frac{45-10}{80-10} = \frac{F-32}{180}$$

$$\frac{35}{70} = \frac{F-32}{180}$$

$$90 + 32 = F$$

$$\boxed{F = 122} \quad **$$

Q) The steam point and ice point of a mercury thermometer are marked as 80º and 10º. At what temperature on centigrade scale the reading of this thermometer will be 59º ?

(A) 70º C   (B) 60º C

(C) 80º C   (D) None of these

Ans. a

$$\frac{T'-10}{80-10} = \frac{T_C}{100} \quad \left\{ T' = 59° \right\}$$

$$\frac{59-10}{70} = \frac{T_C}{100} \quad \Rightarrow \quad \frac{49}{70} \times 100 = T_C$$

$$\Rightarrow \quad \boxed{T_C = 70°C}$$

Q) A difference of temperature of 25°C is equivalent to a difference of :-

(A) 45°F

(B) 72°F

(C) 32°F

(D) 25°F

Ans. a

$$\Delta C = \frac{5}{9} \Delta F$$

$$25 \times \frac{9}{5} = \Delta F \Rightarrow \Delta F = 45°C$$

Q) At what temperature, the Fahrenheit and Celsius scales will give numerically equal (but opposite in sign) values : -

(A) – 40°F and 40°C

(B) 11.43° F and – 11.43°C

(C)–11.43°F and + 11.43°C

(D) + 40°F and – 40°C

Ans. b

$$C = \frac{5}{9}(F - 32) \Rightarrow C = \frac{5}{9}(-C - 32)$$

$$\Rightarrow \quad C = -5C - 160 \quad \Rightarrow 14C = -160$$
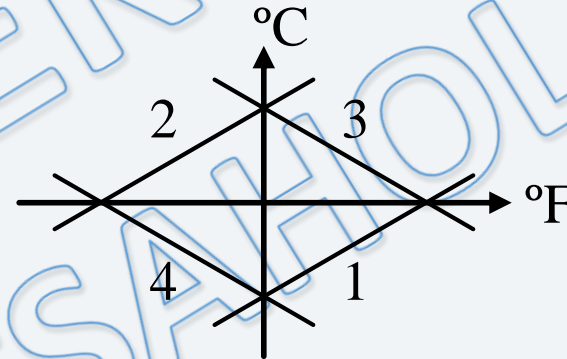
$$\Rightarrow \quad C = -11.43°C$$

Q) Which of the curves in figure represents the relation between Celsius and Fahrenheit temperature-

(A) 1   (B) 2

(C) 3   (D) 4

Ans. a

Sol. [A] $\dfrac{C}{5} = \dfrac{F-32}{9} \implies C = \left(\dfrac{5}{9}\right)F - \dfrac{20}{3}$. Hence graph between °C and °F will be a straight line with positive slope and negative intercept.

Q) Two thermometers X and Y have ice point marked at 15° and 25° and steam points marked as 75° and 125° respectively. When thermometer X measures the temperature of a bath as 60° on it, what would thermometer Y read when it is used to measure the temperature of the same bath ?

(A) 60°   (B) 75°

(C) 100°   (D) 90°

Ans. c

Sol.[C] $\dfrac{60-15}{75-15} = \dfrac{Y-25}{125-25}$

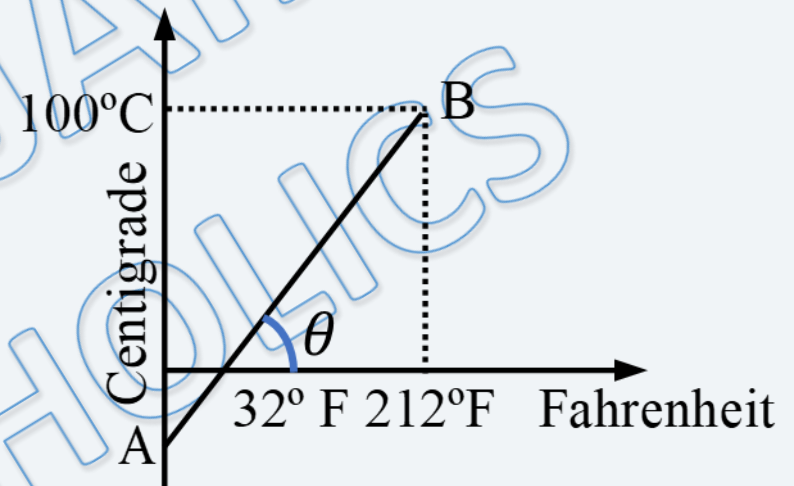$\dfrac{45}{60} = \dfrac{Y-25}{100} \Rightarrow Y = \dfrac{100}{60} \times 45 + 25 = 100°$

Q) The graph shown in the figure is a plot of the temperature of a body in °C and °F. The value of sin ϴ =

(a)$\dfrac{5}{\sqrt{106}}$

(b)$\dfrac{10}{\sqrt{106}}$

(c)$\dfrac{15}{\sqrt{106}}$

(d)$\dfrac{20}{\sqrt{106}}$

Ans. a

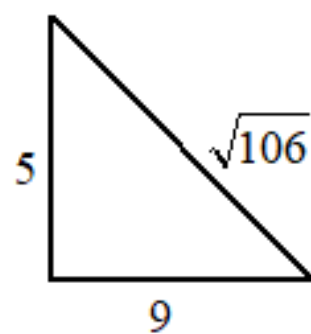$$\frac{C}{100} = \frac{F-32}{180} \Rightarrow C = \frac{5F}{9} - 32 \times \frac{5}{9}$$

$$\sqrt{106}$$

5

9

$$y = mx \pm c, \quad \tan\theta = m = \frac{5}{9}$$

$$\sin\theta = \frac{5}{\sqrt{106}}$$

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