

INTERESTS

A DEFINITIONS

A.1 FINDING THE INTEREST

Ex 1: Louis lends Hugo 100 dollars. After one year, Hugo repays Louis 110 dollars.

Find the interest paid.

10 dollars

Answer: The interest paid is the difference between the amount repaid and the original amount lent:

$$\begin{aligned}\text{Interest} &= \text{Amount repaid} - \text{Original amount} \\ &= 110 - 100 \\ &= 10 \text{ dollars}\end{aligned}$$

Ex 2: Maria borrows 200 dollars from John. After one year, Maria repays John 230 dollars.

Find the interest paid.

30 dollars

Answer: The interest paid is the difference between the amount repaid and the original amount lent:

$$\begin{aligned}\text{Interest} &= \text{Amount repaid} - \text{Original amount} \\ &= 230 - 200 \\ &= 30 \text{ dollars}\end{aligned}$$

Ex 3: Jack lends Sarah 500 dollars. After one year, Sarah repays Jack 525 dollars.

Find the interest paid.

25 dollars

Answer: The interest paid is the difference between the amount repaid and the original amount lent:

$$\begin{aligned}\text{Interest} &= \text{Amount repaid} - \text{Original amount} \\ &= 525 - 500 \\ &= 25 \text{ dollars}\end{aligned}$$

Ex 4: A bank lends 1 000 dollars to a customer. After one year, the customer repays the bank 1 080 dollars.

Find the interest paid.

80 dollars

Answer: The interest paid is the difference between the amount repaid and the original amount lent:

$$\begin{aligned}\text{Interest} &= \text{Amount repaid} - \text{Original amount} \\ &= 1\,080 - 1\,000 \\ &= 80 \text{ dollars}\end{aligned}$$

A.2 FINDING THE TOTAL AMOUNT

Ex 5: A customer borrows 2 500 dollars from a bank, with 150 dollars of interest.

Find the total amount the customer needs to repay the bank.

2650 dollars

Answer: The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 2\,500 + 150 \\ &= 2\,650 \text{ dollars}\end{aligned}$$

Ex 6: Maria borrows 300 dollars from John with 30 dollars of interest.

Find the amount Maria needs to repay.

330 dollars

Answer: The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 300 + 30 \\ &= 330 \text{ dollars}\end{aligned}$$

Ex 7: Jack lends Sarah 500 dollars with 50 dollars of interest. Find the total amount Sarah needs to repay Jack.

550 dollars

Answer: The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 500 + 50 \\ &= 550 \text{ dollars}\end{aligned}$$

Ex 8: A bank lends 1 000 dollars to a customer with 80 dollars of interest.

Find the total amount the customer needs to repay the bank.

1080 dollars

Answer: The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 1\,000 + 80 \\ &= 1\,080 \text{ dollars}\end{aligned}$$

A.3 FINDING THE PRINCIPAL

Ex 9: Emma repaid 330 dollars in total, including 30 dollars of interest.

Find the original amount (principal) that Emma borrowed.

300 dollars

Answer: The principal is the difference between the total amount repaid and the interest paid:

$$\begin{aligned}\text{Principal} &= \text{Amount repaid} - \text{Interest} \\ &= 330 - 30 \\ &= 300 \text{ dollars}\end{aligned}$$

Ex 10: Lucas repaid 550 dollars in total, including 50 dollars of interest.

Find the original amount (principal) that Lucas borrowed.

$$\boxed{500} \text{ dollars}$$

Answer: The principal is the difference between the total amount repaid and the interest paid:

$$\begin{aligned}\text{Principal} &= \text{Amount repaid} - \text{Interest} \\ &= 550 - 50 \\ &= 500 \text{ dollars}\end{aligned}$$

Ex 11: Sophia repaid 1,080 dollars in total, including 80 dollars of interest.

Find the original amount (principal) that Sophia borrowed.

$$\boxed{1000} \text{ dollars}$$

Answer: The principal is the difference between the total amount repaid and the interest paid:

$$\begin{aligned}\text{Principal} &= \text{Amount repaid} - \text{Interest} \\ &= 1,080 - 80 \\ &= 1,000 \text{ dollars}\end{aligned}$$

Ex 12: Mia repaid 750 dollars in total, including 150 dollars of interest.

Find the original amount (principal) that Mia borrowed.


$$\boxed{600} \text{ dollars}$$

Answer: The principal is the difference between the total amount repaid and the interest paid:

$$\begin{aligned}\text{Principal} &= \text{Amount repaid} - \text{Interest} \\ &= 750 - 150 \\ &= 600 \text{ dollars}\end{aligned}$$

B SIMPLE INTEREST


B.1 FINDING THE INTEREST

Ex 13:  Find the simple interest on a principal of \$500 at a rate of 3% per year over 5 years.

$$\boxed{75} \text{ dollars}$$

Answer:


$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 5 \times 3\% \text{ of } 500 \\ &= 5 \times \frac{3}{100} \times 500 \\ &= 75 \text{ dollars}\end{aligned}$$

Ex 14:  Find the simple interest on a principal of \$1 000 at a rate of 4% per year over 3 years.

$$\boxed{120} \text{ dollars}$$

Answer:


$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 3 \times 4\% \text{ of } 1\,000 \\ &= 3 \times \frac{4}{100} \times 1\,000 \\ &= 120 \text{ dollars}\end{aligned}$$

Ex 15:  Find the simple interest on a principal of \$750 at a rate of 5% per year over 2 years.

$$\boxed{75} \text{ dollars}$$

Answer:

$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 2 \times 5\% \text{ of } 750 \\ &= 2 \times \frac{5}{100} \times 750 \\ &= 75 \text{ dollars}\end{aligned}$$


Ex 16:  Find the simple interest on a principal of \$1 200 at a rate of 6% per year over 4 years.

$$\boxed{288} \text{ dollars}$$

Answer:

$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 4 \times 6\% \text{ of } 1\,200 \\ &= 4 \times \frac{6}{100} \times 1\,200 \\ &= 288 \text{ dollars}\end{aligned}$$

B.2 FINDING THE INTEREST OVER MIXED TIME PERIODS

Ex 17:  Find the simple interest on a principal of \$600 at a rate of 4% per year over 18 months.

$$\boxed{36} \text{ dollars}$$


Answer:

- Convert the time from months to years:

$$\begin{aligned}18 \text{ months} &= \frac{18}{12} \text{ years} \\ &= 1.5 \text{ years}\end{aligned}$$

- Calculate the interest:

$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 1.5 \times 4\% \text{ of } 600 \\ &= 1.5 \times \frac{4}{100} \times 600 \\ &= 36 \text{ dollars}\end{aligned}$$

Ex 18:  Find the simple interest on a principal of \$700 at a rate of 5% per year over 180 days.

17.26 dollars (round at two decimal place)


Answer:

- Convert the time from days to years:

$$\begin{aligned} 180 \text{ days} &= \frac{180}{365} \text{ years} \\ &\approx 0.493 \text{ years} \end{aligned}$$

- Calculate the interest:

$$\begin{aligned} \text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 0.493 \times 5\% \text{ of } 700 \\ &= 0.493 \times \frac{5}{100} \times 700 \\ &= 17.26 \text{ dollars} \end{aligned}$$

Ex 19:  Find the simple interest on a principal of \$800 at a rate of 4% per year over 9 months.

24 dollars


Answer:

- Convert the time from months to years:

$$\begin{aligned} 9 \text{ months} &= \frac{9}{12} \text{ years} \\ &= 0.75 \text{ years} \end{aligned}$$

- Calculate the interest:

$$\begin{aligned} \text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 0.75 \times 4\% \text{ of } 800 \\ &= 0.75 \times \frac{4}{100} \times 800 \\ &= 24 \text{ dollars} \end{aligned}$$

Ex 20:  Find the simple interest on a principal of \$1 200 at a rate of 4% per year over 2 years and 6 months.

120 dollars

Answer:


- Convert the time from years and months to just years:

$$\begin{aligned} 2 \text{ years } 6 \text{ months} &= 2 + \frac{6}{12} \text{ years} \\ &= 2 + 0.5 \text{ years} \\ &= 2.5 \text{ years} \end{aligned}$$

- Calculate the interest:

$$\begin{aligned} \text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 2.5 \times 4\% \text{ of } 1\,200 \\ &= 2.5 \times \frac{4}{100} \times 1\,200 \\ &= 120 \text{ dollars} \end{aligned}$$

B.3 FINDING THE TOTAL AMOUNT

Ex 21:  Jack lends Sarah 500 dollars with simple interest over 3 years at a rate of 3% per year. Find the total amount Sarah needs to repay Jack.

545 dollars

Answer:


- The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest.

- Calculate the interest

$$\begin{aligned} \text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 3 \times \frac{3}{100} \times 500 \\ &= 45 \text{ dollars} \end{aligned}$$

- Calculate the total amount to repay:

$$\begin{aligned} \text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 500 + 45 \\ &= 545 \text{ dollars} \end{aligned}$$

Ex 22:  Emma borrows 600 dollars from a bank with simple interest over 4 years at a rate of 2.5% per year. Find the total amount Emma needs to repay the bank.

660 dollars

Answer:


- The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest.

- Calculate the interest

$$\begin{aligned} \text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 4 \times \frac{2.5}{100} \times 600 \\ &= 60 \text{ dollars} \end{aligned}$$

- Calculate the total amount to repay:

$$\begin{aligned} \text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 600 + 60 \\ &= 660 \text{ dollars} \end{aligned}$$

Ex 23:  Michael lends 800 dollars to a friend with simple interest over 2 years at a rate of 4% per year. Find the total amount the friend needs to repay Michael.

864 dollars

Answer:

- The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest.

- Calculate the interest

$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 2 \times \frac{4}{100} \times 800 \\ &= 64 \text{ dollars}\end{aligned}$$

- Calculate the total amount to repay:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 800 + 64 \\ &= 864 \text{ dollars}\end{aligned}$$



Ex 24: Sophia borrows 1 200 dollars with simple interest over 5 years at a rate of 2.5% per year. Find the total amount Sophia needs to repay.

1350 dollars

Answer:

- The total amount to be repaid is the sum of the original amount borrowed (the principal) and the interest.
- Calculate the interest

$$\begin{aligned}\text{Interest} &= \text{Number of years} \times \text{Percentage of the principal} \\ &= 5 \times \frac{2.5}{100} \times 1\,200 \\ &= 150 \text{ dollars}\end{aligned}$$

- Calculate the total amount to repay:

$$\begin{aligned}\text{Amount to repay} &= \text{Principal} + \text{Interest} \\ &= 1\,200 + 150 \\ &= 1\,350 \text{ dollars}\end{aligned}$$