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.

$\boxed{10}$ dollars

Solution: 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.

$\boxed{30}$ dollars

Solution: 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.

$\boxed{25}$ dollars

Solution: 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.

$\boxed{80}$ dollars

Solution: 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.

$\boxed{2650}$ dollars

Solution: 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.

$\boxed{330}$ dollars

Solution: 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.

$\boxed{550}$ dollars

Solution: 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.

$\boxed{1080}$ dollars

Solution: 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.

$\boxed{300}$ dollars

Solution: 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.

$\boxed{500}$ dollars

Solution: 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.

$\boxed{1000}$ dollars

Solution: 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.

$\boxed{600}$ dollars

Solution: 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 (you can use a calculator).

$\boxed{75}$ dollars

Solution:

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

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

$\boxed{120}$ dollars

Solution:

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

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

$\boxed{75}$ dollars

Solution:

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

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

$\boxed{288}$ dollars

Solution:

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

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 (you can use a calculator).

$\boxed{36}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{17.26}$ dollars (round at two decimal place)

Solution:

- 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 (you can use a calculator).

$\boxed{24}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{120}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{545}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{660}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{864}$ dollars

Solution:

- 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 (you can use a calculator).

$\boxed{1350}$ dollars

Solution:

- 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:

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