



# EXAM PAPERS PRACTICE

## Percentages

### Model Answers

## Question 1

Robert buys a car for \$8000.

At the end of each year the value of the car has decreased by 10% of its value at the beginning of that year.

Calculate the value of the car at the end of 7 years.

[2]

Answer:

*the value of the car at the end of 7 years is approximately \$3826.40.*

## Question 2

Ahmed paid \$34 000 for a car.

His car decreased in value by 40% at the end of the first year.

The value at the end of the second year was 10% less than the value at the end of the first year.

Calculate the value of Ahmed's car after 2 years.

[2]

Answer:

*We need to calculate the value of the car after the second year. The car decreased in value by 40% from the value at the end of the first year, so we subtract 40% from 100% to get 60%. This means the car is worth 60% of its value at the end of the first year. So,  $\$34\,000 * 60/100 = \$20\,400$ . Therefore, the value of Ahmed's car after 2 years is \$20 360.*

### Question 3

Hazel invests \$1800 for 7 years at a rate of 1.5% per year compound interest.

Calculate how much interest she will receive after the 7 years.

Give your answer correct to the nearest dollar.

[4]

Answer:

*To find this, we subtract the principal from the total amount:*

$$\text{Interest} = A - P \quad \text{Interest} = \$1996.86 - \$1800 \quad \text{Interest} = \$196.86$$

*Rounding to the nearest dollar, Hazel will receive approximately \$197 in interest after 7 years.*



## Question 4

Indira buys a television in a sale for \$924.  
This was a reduction of 12% on the original price.

[3]

Calculate the original price of the television.

Answer:

*First, we need to understand that the \$924 is 88% of the original price because it was reduced by 12%. So, if we let  $X$  be the original price, we can set up the equation:  $0.88X = \$924$*

*To solve for  $X$ , we divide both sides of the equation by 0.88:  $X = \$924 / 0.88$   $X = \$1050$  So, the original price of the television was \$1050.*



## Question 5 EXAM PAPERS PRACTICE

Georg invests \$5000 for 14 years at a rate of 2% per year compound interest.

Calculate the interest he receives.  
Give your answer correct to the nearest dollar.

[4]

Answer:

*\$1595*



## Question 6

Amalie makes a profit of 20% when she sells a shirt for \$21.60.

Calculate how much Amalie paid for the shirt.

[2]

Answer:

*To find out 100% (or the original cost), we can set up a proportion:  $120/100 = 21.60/x$   
Solving for  $x$  gives us:  $x = 21.60 * 100 / 120$   $x = \$18$  So, Amalie paid \$18 for the shirt.*

## Question 7

A student played a computer game 500 times and won 370 of these games.

He then won the next  $x$  games and lost none.

He has now won 75% of the games he has played.

Find the value of  $x$ .

[4]

Answer:

*Solving this equation for  $x$ , we get:  $0.75 * (500 + x) = 370 + x$ ,  $375 + 0.75x = 370 + x$ ,  $0.25x = 5$ ,  
 $x = 5 / 0.25$ ,  $x = 20$ . So, the student won 20 more games.*



### Question 8

A house was built in 1985 and cost \$62 000.  
It was sold in 2003 for \$310 000.

- (a) Work out the 1985 price as a percentage of the 2003 price. [2]

Answer:

*To find the 1985 price as a percentage of the 2003 price, we divide the 1985 price by the 2003 price and multiply by 100. So,  $\$62000 / \$310000 * 100 = 20\%$*

- (b) Calculate the percentage increase in the price from 1985 to 2003. [2]

Answer:

*To calculate the percentage increase in the price from 1985 to 2003, we first find the difference in price, then divide by the original price and multiply by 100. So,  $(\$310000 - \$62000) / \$62000 * 100 = 400\%$*

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### Question 9

In 1997 the population of China was  $1.24 \times 10^9$ .  
In 2002 the population of China was  $1.28 \times 10^9$ .  
Calculate the percentage increase from 1997 to 2002.

[2]

Answer:

*First, we need to find the difference in population from 1997 to 2002.  
 $1.28 \times 10^9 - 1.24 \times 10^9 = 0.04 \times 10^9$   
We need to find out what percentage this difference is of the 1997 population.  
 $(0.04 \times 10^9 / 1.24 \times 10^9) \times 100 = 3.23\%$  So, the population of China increased by approximately 3.23% from 1997 to 2002.*



### Question 10

Abdul invested \$240 when the rate of simple interest was  $r\%$  peryear.  
After  $m$  months the interest was \$ $I$ .

Write down and simplify an expression for  $I$ , in terms of  $m$  and  $r$ .

[2]

Answer:

$$I = 240 * (r/100) * (m/12) \text{ Simplifying this expression gives us: } I = 2mr.$$

### Question 11

A baby was born with a mass of 3.6 kg.

After three months this mass had increased to 6 kg.

Calculate the percentage increase in the mass of the baby.

[2]

Answer:

*We need to find out what percentage this increase represents of the original mass. We do this by dividing the increase by the original mass and then multiplying by 100 to get a percentage. So,  $(2.4 \text{ kg} / 3.6 \text{ kg}) * 100 = 66.67\%$ . Therefore, the baby's mass has increased by approximately 67%.*



### Question 12

Write 55 g as a percentage of 2.2 kg.

[2]

Answer:

*To do this, we divide 55 by 2200 and then multiply the result by 100 to get the percentage.  
 $55 \div 2200 = 0.025$   $0.025 \times 100 = 2.5$  So, 55g is 2.5% of 2.2kg.*

### Question 13

Work out 85 cents as a percentage of \$2.03 .

[1]

Answer:

*First, we need to convert \$2.03 into cents, which is 203 cents. Then, we divide 85 (the part) by 203 (the whole) and multiply by 100 to get the percentage. So,  $85 \div 203 \times 100 = 41.87\%$ .*

*Therefore, 85 cents is approximately 41.87% of \$2.03.*

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### Question 14

From a sample of 80 batteries, 3 are faulty.

Work out the percentage of faulty batteries.

[1]

Answer:

*First, we need to find out the proportion of faulty batteries in the sample.  
This is done by dividing the number of faulty batteries by the total number of batteries.  
So,  $3 \text{ faulty batteries} / 80 \text{ total batteries} = 0.0375$  To convert this proportion to a percentage,  
we multiply by 100. So,  $0.0375 \times 100 = 3.75\%$*

*Therefore, the percentage of faulty batteries in the sample is 3.75%.*





### Question 15

Jasjeet and her brother collect stamps.  
When Jasjeet gives her brother 1% of her stamps, she has 2475 stamps left.

Calculate how many stamps Jasjeet had originally. [3]

Answer:

*First, we know that after giving away 1% of her stamps, Jasjeet has 2475 stamps left. This means that 2475 stamps represent 99% of her original collection (since she has given away 1%).*

*To find out how many stamps Jasjeet had originally, we need to calculate what 100% would be. If 99% equals 2475, then 1% equals 2475 divided by 99, which is 25.*

*Therefore, 100% (the original number of stamps) equals 25 multiplied by 100, which is 2500. So, Jasjeet originally had 2500 stamps.*

### Question 16

In a sale, the cost of a coat is reduced from \$85 to \$67.50 . [3]

Calculate the percentage reduction in the cost of the coat.

Answer:

*First, we need to find out how much the cost was reduced by. We do this by subtracting the new cost from the original cost. So,  $\$85 - \$67.50 = \$17.50$*

*We need to find out what percentage \$17.50 is of the original cost. We do this by dividing \$17.50 by \$85 and then multiplying by 100 to get the percentage. So,  $(\$17.50 / \$85) * 100 = 20.59\%$  Therefore, the cost of the coat was reduced by approximately 20.59%.*

**Question 17**

The population of Dubai at the end of 2012 was 2.1 million.  
This was predicted to increase at a rate of 6% each year.

Calculate the predicted population of Dubai at the end of 2015.

[3]

Answer:

*First, we need to calculate the population increase for each year. For the end of 2013, we calculate 6% of 2.1 million, which is  $0.06 * 2.1 \text{ million} = 0.126 \text{ million}$ . We add this to the 2012 population to get  $2.1 \text{ million} + 0.126 \text{ million} = 2.226 \text{ million}$ .*

*For the end of 2014, we calculate 6% of 2.226 million, which is  $0.06 * 2.226 \text{ million} = 0.13356 \text{ million}$ .*

*We add this to the 2013 population to get  $2.226 \text{ million} + 0.13356 \text{ million} = 2.35956 \text{ million}$ .*

*For the end of 2015, we calculate 6% of 2.35956 million, which is  $0.06 * 2.35956 \text{ million} = 0.1415736 \text{ million}$ .*

*We add this to the 2014 population to get  $2.35956 \text{ million} + 0.1415736 \text{ million} = 2.5011336 \text{ million}$ . So, the predicted population of Dubai at the end of 2015 is approximately 2.5 million.*

**Question 18**

Anita buys a computer for \$391 in a sale.  
The sale price is 15% less than the original price.

Calculate the original price of the computer.

[3]

Answer:

*First, we know that the sale price is 85% of the original price because it's 15% less than the original price. So, if we let  $X$  be the original price, we can set up the equation:  
 $0.85X = \$391$*

*To solve for  $X$ , we divide both sides of the equation by 0.85:  $X = \$391 / 0.85$   $X = \$460$   
So, the original price of the computer was \$460.*



### Question 19

Calculate 17.5% of 44kg.

[2]

Answer:

7.7

### Question 20

Emily invests \$ $x$  at a rate of 3% per year simple interest.  
After 5 years she has \$20.10 interest.

[3]

Find the value of  $x$ .

Answer:

*First, we know that the formula for simple interest is  $I = PRT$ , where  $I$  is the interest,  $P$  is the principal amount (the initial amount of money),  $R$  is the rate of interest, and  $T$  is the time in years.*

*In this case, we know that  $I = \$20.10$ ,  $R = 3\%$  or  $0.03$  (as a decimal), and  $T = 5$  years. We want to find  $P$ , the principal amount. So, we can set up the equation as follows:  $20.10 = P * 0.03 * 5$*

*Solving for  $P$ , we get:  $P = 20.10 / (0.03 * 5)$   $P = 20.10 / 0.15$   $P = \$134$  So, Emily invested \$134.*



### Question 21

In 2012 the cost of a ticket to an arts festival was \$30.

This was 20% more than the ticket cost in 2011.

[3]

Calculate the cost of the ticket in 2011.

Answer:

*First, we know that the cost in 2012 was 20% more than the cost in 2011. This means that the cost in 2011 was 100% of the original price, and the cost in 2012 was 120% of the original price. If we let  $x$  represent the cost in 2011, we can set up the equation  $1.2x = \$30$  to represent this situation.*

*To solve for  $x$ , we divide both sides of the equation by 1.2:  $x = \$30 / 1.2 = \$25$  So, the cost of the ticket in 2011 was \$25.*

### Question 22

The Tiger Sky Tower in Singapore has a viewing capsule which holds 72 people.

This number is 75% of the population of Singapore when it was founded in 1819.

[2]

What was the population of Singapore in 1819?

Answer:

*First, we need to understand that 72 people is 75% of the population of Singapore in 1819. To find the total population, we need to calculate 100% of the population. If 75% is equal to 72 people, then 1% is equal to 72 people divided by 75, which is 0.96 people.*

*Therefore, 100% (the total population of Singapore in 1819) would be 0.96 people times 100, which is 96 people.*



### Question 23

Samantha invests \$600 at a rate of 2% per year simple interest.

[2]

Calculate the interest Samantha earns in 8 years.

Answer:

*First, we need to understand what simple interest is. Simple interest is calculated by multiplying the initial investment (also known as the principal) by the interest rate and the time the money is invested for.*

*In this case, the principal is \$600, the interest rate is 2% (or 0.02 when expressed as a decimal), and the time is 8 years.*

*So, the formula for simple interest is: Interest = Principal  $\times$  Rate  $\times$  Time Substituting the given values into the formula, we get: Interest = \$600  $\times$  0.02  $\times$  8 Doing the multiplication, we find that the interest Samantha earns in 8 years is \$96.*

### Question 24

Maria pays \$84 rent.  
The rent is increased by 5%.

[2]

Calculate Maria's new rent.

Answer:

*First, we need to calculate the increase in the rent. To do this, we multiply the original rent by the percentage increase. So, \$84  $\times$  5/100 = \$4.20 Then, we add this increase to the original rent to find the new rent. So, \$84 + \$4.20 = \$88.20*

*Therefore, Maria's new rent is \$88.20.*

## Question 25

Shania invests \$750 at a rate of  $2\frac{1}{2}\%$  per year simple interest.

Calculate the **total** amount Shania has after 5 years.

[3]

Answer:

843.75

## Question 26

The taxi fare in a city is \$3 **and** then \$0.40 for every kilometre travelled.

[2]

(a) A taxi fare is \$9.

How far has the taxi travelled?

Answer:

*First, we need to subtract the initial fare from the total fare to find out how much the distance travelled cost. So,  $\$9 - \$3 = \$6$ . Then, we divide this amount by the cost per kilometre to find the distance travelled. So,  $\$6 \div \$0.40 = 15$  kilometres.*

*Therefore, the taxi has travelled 15 kilometres*

(b) Taxi fares cost 30 % more at night.

How much does a \$9 daytime journey cost at night?

[2]

Answer:

*To find out how much a \$9 daytime journey costs at night, we need to calculate the 30% increase. So,  $\$9 \times 30/100 = \$2.70$ . Then, we add this amount to the original fare to find the night fare. So,  $\$9 + \$2.70 = \$11.70$ .*

*Therefore, a \$9 daytime journey costs \$11.70 at night.*



### Question 27

Hans invests \$750 for 8 years at a rate of 2% per year simple interest.

[2]

Calculate the interest Hans receives.

Answer:

*First, we need to understand the formula for simple interest, which is  $I = PRT$ , where  $I$  is the interest,  $P$  is the principal amount (the initial amount of money),  $R$  is the rate of interest per year, and  $T$  is the time the money is invested for in years. In this case,  $P = \$750$ ,  $R = 2\%$  or  $0.02$  (as a decimal), and  $T = 8$  years.*

*Substituting these values into the formula, we get:  $I = 750 * 0.02 * 8 = \$120$ . So, Hans receives \$120 in interest.*

### Question 28

Maria decides to increase her homework time of 8 hours per week by 15%.

Calculate her new homework time.

Give your answer in hours and minutes.

[3]

Answer:

*First, we need to calculate 15% of 8 hours.  $15\%$  of 8 hours =  $0.15 * 8 = 1.2$  hours Then, we add this to the original 8 hours to find the new homework time.*

*8 hours + 1.2 hours = 9.2 hours To convert the decimal part of the hours into minutes, we multiply by 60 (since there are 60 minutes in an hour).  $0.2$  hours \* 60 minutes/hour = 12 minutes So, Maria's new homework time is 9 hours and 12 minutes.*



### Question 29

During a marathon race an athlete loses 2 % of his mass.  
At the end of the race his mass is 67.13 kg.

Calculate his mass before the race.

[3]

Answer:

*First, we need to understand that the athlete's mass after the race is 98% of his original mass (since he lost 2%). So, if we let  $X$  be his original mass, we can set up the equation:  
 $0.98X = 67.13$*

*To solve for  $X$ , we divide both sides of the equation by 0.98:  $X = 67.13 / 0.98$   $X = 68.5$  kg  
So, the athlete's mass before the race was 68.5 kg.*



### Question 30

A concert hall has 1540 seats.

Calculate the number of people in the hall when 55% of the seats are occupied.

[1]

Answer:

*First, we need to find out what 55% of 1540 is. To do this, we multiply 1540 by 0.55 (which is the decimal equivalent of 55%).*

*$1540 * 0.55 = 847$  So, when 55% of the seats are occupied, there are 847 people in the hall.*



**Question 31**

In 1970 the population of China was  $8.2 \times 10^8$ .

In 2007 the population of China was  $1.322 \times 10^9$ .

Calculate the population in 2007 as a percentage of the population in 1970.

[2]

Answer:

*First, we need to understand the numbers given. The population of China in 1970 was  $8.2 \times 10^8$  and in 2007 it was  $1.322 \times 10^9$ .*

*We need to calculate the percentage. The formula for finding the percentage is (New Number / Original Number)  $\times$  100. So, we substitute the given values into the formula:  $(1.322 \times 10^9 / 8.2 \times 10^8) \times 100 = 161.22\%$  Therefore, the population of China in 2007 was approximately 161.22% of the population in 1970.*

**Question 32**

In 2004 Colin had a salary of \$7200.

[2]

(a) This was an increase of 20% on his salary in 2002.

Calculate his salary in 2002.

Answer:

*If Colin's salary in 2004 was an increase of 20% from his salary in 2002, then his salary in 2002 was 100% of his 2002 salary. If we let X represent his 2002 salary, then 120% of X is equal to his 2004 salary.*

*In mathematical terms, this can be represented as  $1.2X = \$7200$ . To solve for X, we divide both sides of the equation by 1.2, which gives us  $X = \$7200 / 1.2 = \$6000$ . So, Colin's salary in 2002 was \$6000.*

(b) In 2006 his salary increased to \$8100.

Calculate the percentage increase from 2004 to 2006.

[2]

Answer:

*To calculate the percentage increase from 2004 to 2006, we first need to find the difference between his salary in 2006 and his salary in 2004.*

*This is  $\$8100 - \$7200 = \$900$ . The percentage increase is then this difference divided by his 2004 salary, multiplied by 100%. In mathematical terms, this is  $(\$900 / \$7200) \times 100\% = 12.5\%$ . So, Colin's salary increased by 12.5% from 2004 to 2006.*



### Question 33

Celine invests \$ 800 for 5 **months** at 3% simple interest per year.  
Calculate the interest she receives.

[2]

Answer:

*First, we need to calculate the annual interest she would receive. This is done by multiplying the principal amount (\$800) by the interest rate (3% or 0.03). So,  $\$800 * 0.03 = \$24$ . However, this is the interest for a whole year. Celine only invests her money for 5 months. There are 12 months in a year, so 5 months is  $5/12$  of a year.*

*Therefore, we need to multiply the annual interest by  $5/12$  to find the interest for 5 months. So,  $\$24 * 5/12 = \$10$ . Therefore, Celine receives \$10 in interest.*

### Question 34

Sara has \$3000 to invest for 2 years.

She invests the money in a bank which pays simple interest at the rate of 7.5 % per year.

Calculate how much interest she will have at the end of the 2 years.

[2]

Answer:

*First, we need to calculate the annual interest. The formula for simple interest is  $I = PRT$ , where  $I$  is the interest,  $P$  is the principal amount (the initial amount of money),  $R$  is the rate of interest, and  $T$  is the time in years.*

*In this case,  $P = \$3000$ ,  $R = 7.5/100 = 0.075$  (because the rate is given in percentage), and  $T = 2$  years. So, the interest for 2 years is  $I = PRT = \$3000 * 0.075 * 2 = \$450$ .*

*Therefore, Sara will have \$450 in interest at the end of the 2 years.*



### Question 35

In 1950, the population of Switzerland was 4 714 900. In 2000, the population was 7 087 000.

- (a) Work out the percentage increase in the population from 1950 to 2000. [2]

Answer:

*To find the percentage increase in the population from 1950 to 2000, we first need to find the difference in population between these two years. The population in 2000 was 7 087 000 and in 1950 it was 4 714 900. So, the difference is  $7\,087\,000 - 4\,714\,900 = 2\,372\,100$ .*

*We divide this difference by the population in 1950 (the starting value) and multiply by 100 to convert it to a percentage. So, the percentage increase is  $(2\,372\,100 / 4\,714\,900) \times 100 = 50.3\%$  (rounded to one decimal place).*

- (b) (i) Write the 1950 population correct to 3 significant figures. [1]

Answer:

*The 1950 population correct to 3 significant figures is 4 710 000.*

- (ii) Write the 2000 population in standard form. [1]

Answer:

*To write the 2000 population in standard form, we express it as a number between 1 and 10 multiplied by a power of 10. The 2000 population is 7 087 000, which can be written as  $7.087 \times 10^6$  in standard form.*

### Question 36

Nyali paid \$62 for a bicycle. She sold it later for \$46. What was her percentage loss? [2]

Answer:

*First, we need to find out how much Nyali lost on the sale. We do this by subtracting the selling price from the purchase price.  $\$62 - \$46 = \$16$*

*We need to find out what percentage \$16 is of the original price of \$62. We do this by dividing the loss by the original price and then multiplying by 100 to get a percentage.  $(\$16 / \$62) * 100 = 25.81\%$  So, Nyali had a loss of approximately 25.81% on the sale of the bicycle.*