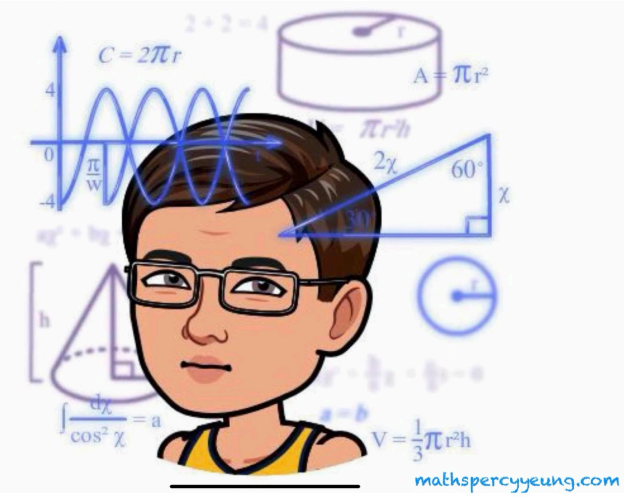

School-Based Exercise

(S.B.E)

Chapter 4
Percentages (II)

Name: _____ ( )

Class: _____

Percentage Change

Percentage change represents the change in value as a percentage of the original value.

1. **Percentage change** $= \dfrac{\text{New value} - \text{Original value}}{\text{Original value}} \times 100\%$
2. **Change = original value × percentage change**
3. **New value = original value × (1 + percentage change)**

Exercise 2A

1. Find the percentage change when a value changes from
   (a) 156 to 195, **(b)** 360 to 306.

2. **(a)** When 50 increases by 6%, find the new value.
   (b) When 125 decreases by 28%, find the new value.

3. When a number increases by 16%, it becomes 87. Find the original number.

4. When a number decreases by 45%, it becomes 374. Find the original number.

5. The original price of a novel was \$200. Its price decreased by 10% in the first year and then further decreased by 20% in the second year. Find the price of the novel
   (a) in the first year,
   (b) in the second year.

6. Kay's weight was 75 kg in March. Her weight decreased by 4% in April, then increased by 5% in May. Find Kay's weight in May.

7. The price of a chair was \$880. The price was first increased by 15%, and then decreased by 10%. Find the new price of the chair.

8. The number of tourists to a city was 6 200 000 in 2013. The number of tourists increased by 16% in 2014 and then further increased by 12% in 2015.
   (a) Find the number of tourists to the city in 2015.
   (b) Find the percentage change in the number of tourists from 2013 to 2015.

9. Martin invests \$10 000 in a fund. He gains 6% in the first month, and then loses 3% in the second month. Find the percentage change in Martin's investment over these two months.

10. The number of bacteria in a petri dish was 2500 at the beginning of an experiment. The number decreased by 2% in the first hour and increased by 16% in the second hour. Find the percentage change in the number of bacteria over these two hours.

11. A number increases by 28% and then decreases by 50%. If the resulting number is 32, find the original number.

12. Amy bought a mobile phone for $\$x$. She sold the mobile phone to Belly at a loss of 30% and Belly sold it to Carman at a profit of 10%. If Carman bought the mobile phone for \$4466, find the value of x.

13. The income and the expenditure of a bookstore were \$165 000 and \$129 000 respectively last month. This month, the income and the expenditure of the bookstore increase by 35% and 24% respectively.
(a) Find the income and the expenditure of the bookstore this month.
(b) Find the change in the profit of the bookstore over these two months.

14. There were 460 male students and 540 female students in a school last year. This year, the number of male students decreases by 15% and the number of female students increases by 20%.
(a) Find the numbers of male students and female students in the school this year.
(b) Find the percentage change in the number of students in the school over these two years.

15. A boutique sold 50 skirts at \$340 each last week. This week, the price of each skirt decreases by 20% and the number of skirts sold increases by 20%.
(a) Find the revenue made by the boutique from selling the skirts this week.
(b) Find the percentage change in the revenue made by selling the skirts over these two weeks.

16. The cost of making an artifact is \$680, of which 45% is for materials and the rest is for labour cost. If the cost of materials is increased by 5% and the labour cost is increased by 25%,
(a) find the new cost of making the artifact,
(b) find the percentage change in the cost of making the artifact.

17. The dimensions of a rectangular photo are 15 cm × 10 cm. If both the length and the width of the photo are reduced by 8%,
(a) find the area of the photo after reduction,
(b) find the percentage change in the area of the photo.

18. The base radius and the height of a cylinder are 5 cm and 15 cm respectively. If the base radius increases by 20% and the height decreases by 12%,
(a) find the new volume of the cylinder in terms of π,
(b) find the percentage change in the volume of the cylinder.

19. The population of a city decreased by 4% from 2012 to 2013, and increased by 5% each year afterwards. Find the percentage change in the population of the city from 2012 to 2015.

20. The base of a triangle increases by 32% and its height decreases by 18%. Find the percentage change in the area of the triangle.

21. The number of swimmers in a beach increased by 260% from June to August and then decreased by 60% from August to October. The number of swimmers in August was 4752 more than that in October. Find the number of swimmers in the beach in

(a) August, **(b)** June.

22. A number is first increased by y% and then reduced by x%. If the number obtained is equal to the original number, express x in terms of y.

23. The hourly wage of a part time worker decreases by 4.5%. In order to keep the daily income unchanged, what must the percentage change in the working time be?
(*Give the answer correct to 2 decimal places.*)

24. In a drink, the ratio of the volume of apple juice to that of orange juice was 4 : 5. A new drink is prepared by increasing the volume of apple juice by 11% and decreasing the volume of orange juice by 2.5%. What was the percentage change in the total volume in these two drinks?

Growth and Decay

If a quantity grows at a constant rate of $r\%$ per period, then

new value after n periods = original value $\times (1 + r\%)^n$

$r\%$ is called the growth rate.

$(1 + r\%)$ is called the growth factor.

If a quantity decreases at a constant rate of $r\%$ per period, then

new value after n periods = original value $\times (1 - r\%)^n$

$r\%$ is called the decay rate.

$(1 - r\%)$ is called the decay factor.

Exercise 2B

1. The present value of an antique vase is \$10 000. If its value increases by 12% each year, what will its value be after two years?

2. The present price of a pair of shoes is \$2300. If its price increases by 2% each month, what will its price be after four months?
   (*Give the answer correct to the nearest dollar.*)

3. The number of a certain kind of germ in a room increases by 100% every 4 hours. If there are 60 germs initially, how many germs will there be in the room 24 hours later?

4. In 2011, the number of private cars in a city was 450 000. The number of private cars was estimated to increase by 5% every year.
   (a) Find the number of private cars in 2015.
   (b) Find the increase in the number of private cars from 2011 to 2015.
   (*Give the answers correct to the nearest integer.*)

5. Franco buys a computer for \$7200 today. Its value will decrease by 14% each year. Find the value of the computer after two years.

6. Ryan bought a digital camera for \$13 000 three years ago. Its value has decreased by 20% each year. Find the present value of the digital camera.

7. The present price of a machine is \$680 000. The price of the machine decreases by 6% every quarter. What will its price be after 2 years?
   (*Give the answer correct to the nearest thousand dollar.*)

8. The temperature of a glass of boiling water is 100°C. The temperature of the water decreases by 17% every 10 minutes.
   (a) Find the temperature of the glass of water half an hour later.
   (b) Find the decrease in the temperature of the glass of water over this half hour.
   (*Give the answers correct to the nearest 0.1°C.*)

9. The number of fish in a pond has increased at a constant rate of 8% per year. If the number of fish was 9600 in 2014, what was the number of fish in 2008?
   (*Give the answer correct to the nearest integer.*)

10. The weight of a baby has increased by 4% each month. If the present weight of the baby is 11 kg, what was the weight of the baby five months ago?
    (*Give the answer correct to the nearest 0.1 kg.*)

11. The number of members of a fitness centre has increased by 3% every quarter. The fitness centre has 8000 members at present. Find the number of members of the centre four years ago.
    (*Give the answer correct to the nearest integer.*)

12. The price of a pair of headphones decreases at a constant rate of 5% per year. If the present price of the pair of headphones is $722, find its price two years ago.

13. Nick bought a watch two years ago and its price has decreased by 15% every half year. If the present price of the watch is $7830, how much did Nick pay for the watch?
    (*Give the answer correct to the nearest dollar.*)

14. The storage capacity of a reservoir has decreased by 12% every month. If the present storage capacity of the reservoir is 54 000 m^3, find the storage capacity of the reservoir one year ago.
    (*Give the answer correct to 3 significant figures.*)

15. John's average monthly investments in 2012 and 2013 were $4000 and $4500 respectively.
    (a) Find the percentage change in the average monthly investment from 2012 to 2013.
    (b) If the growth factor of the average monthly investment remains unchanged in each subsequent year, find John's average monthly investment in 2015, correct to the nearest dollar.

16. The numbers of readers of a mobile library were 1500 and 1290 in May and June respectively.
    (a) Find the percentage change in the number of readers of the mobile library from May to June.
    (b) Suppose the decay factor of the number of readers remains unchanged in each subsequent month. Find the number of readers of the mobile library in September, correct to the nearest integer.

17. A boy is currently 1.2 m tall. His height will increase by 8% in the following year and then 5% in each subsequent year.

(a) Find the height of the boy one year later.

(b) Find the height of the boy four years later.

(*Give the answers correct to 3 significant figures.*)

18. The expenditure of a family was \$72 000 in 2010. In the following two years, the expenditure decreased by 10% each year. After that, the expenditure decreased by 15% in each subsequent year.

(a) Find the expenditure of the family in 2012.

(b) Find the expenditure of the family in 2014.

19. The urban area of a city in 2006 was 88 km^2. Due to development, the urban area of the city has increased by 4% every 5 years.

(a) Find the urban area of the city in the year

(i) 2021, **(ii)** 2046.

(b) Find the increase in the urban area of the city from 2021 to 2046.

(*Give the answers correct to the nearest km^2.*)

20. The value of a gold coin increases by 16% every year. It is given that the value of the gold coin was \$4350 in 2013.

(a) Find the value of the gold coin in 2012.

(b) Find the increase in the value of the gold coin from 2012 to 2014.

21. The number of customers of a boutique increases at a constant rate of 1.5% per month. There were 3680 customers of the boutique in June 2015.

(a) Find the number of customers of the boutique in January 2015.

(b) Find the increase in the number of customers of the boutique from January to December 2015.

(*Give the answers correct to the nearest integer.*)

22. The number of a kind of shark was 200 000 in 2004. Due to overfishing, its number decreased by 40% every two years.

(a) Find its number in 2010.

(b) Find the decrease in its number from 2010 to 2014.

23. The number of crimes reported in a city decreases by 2% each year. It is known that there were 240 100 crimes reported in the city in 2010.

(a) Find the number of crimes reported in the city in 2008.

(b) Find the decrease in the number of crimes reported in the city from 2008 to 2015, correct to the nearest integer.

24. The annual profit of a factory is expected to increase by 5% each year.

(a) The profit of the factory in 2014 was \$2 500 000. Find the profit of the factory in 2010, correct to the nearest thousand dollars.

(b) Find the overall percentage change in the profit of the factory from 2010 to 2014, correct to 3 significant figures.

25. The selling price of tea was \$56/kg in 2005. In the following three years, the selling price of tea increased by 9% each year. After that, the selling price of tea decreased by 8% each year.

(a) Find the selling price of tea in 2013.

(b) Find the overall percentage change in the selling price of tea from 2005 to 2013.

(*Give the answers correct to 3 significant figures.*)

26. Mrs Chan buys diamond A for \$38 000 and diamond B for \$16 000. The value of diamond A decreases 6% each year and the value of diamond B increases 9% each year.

(a) Which diamond has a higher value six years later?

(b) Mrs Chan sells both diamonds six years later. Find the overall profit or loss per cent.

(*Give the answer correct to 3 significant figures.*)

27. The time recorded from a clock is expected to delay 0.05% each hour. Find the overall percentage change in the time recorded from the clock on a day, correct to 3 significant figures.

28. The value of a bottle of red wine was \$2300 in 2002. Its value has increased by a constant rate every year. If its value was \$2783 in 2010, find the increase in the value of the bottle of red wine from 2010 to 2014.

29. The quarterly profit made by a new company grows by 10% each quarter. The total profit in the first year was \$139 230. Let \$$x$ be the profit made by the company in the first quarter.

(a) Express the total profit made by the company in the first year in terms of x.

(b) Find the value of x.

(c) Find the total profit made by the company in the second year, correct to the nearest thousand dollars.

Simple Interest

Suppose $\$P$ is deposit at an interest rate $r\%$ per period for t period. A simple interest $\$I$ and an amount $\$A$ are got. We have the following

$I = A - P$

$I = P \times r\% \times t$

$A = P \times (1 + r\% \times t)$

Exercise 2C

1. Jackie deposits \$63 000 in a bank. The bank will pay him a simple interest of \$500 after several years. How much is the amount?

2. Kelly puts \$74 000 in a bank. How much is the simple interest when the amount is \$90 000?

3. Find the simple interest received when \$20 000 has been deposited in a bank at a simple interest rate of 3% p.a. for a year.

4. Find the simple interest received when \$1800 has been deposited in a bank at a simple interest rate of 5% p.a. for 2 years.

5. Lennon deposits \$46 000 in a bank at a simple interest rate of 2.5% per annum. Find the simple interest he will receive after 6 months.

6. Sam borrows \$60 000 from a bank at a simple interest rate of 8% p.a. If he repays the loan after 1.5 years, how much simple interest should he pay?

7. Yan deposits \$95 000 in a bank at a simple interest rate of 6.4% p.a. How much will the amount be after 2 years?

8. Matthew deposits \$28 800 in a bank at a simple interest rate of 5% p.a.
   (a) How many years is 30 months?
   (b) How much will the amount be after 30 months?

9. Karen had borrowed \$40 500 from a bank at a simple interest rate of 12% per annum. She repaid the loan after 3 years. How much did she pay the bank in total?

10. Ella deposits \$19 200 in a bank which offers a simple interest rate of 4% p.a. She will receive an simple interest of \$1536 after t years.

(a) Write down an equation of t.

(b) Find the value of t.

11. Simon deposits \$120 000 in a bank at a simple interest rate of 1.5% p.a. A simple interest of \$600 will be received.

(a) Find the amount.

(b) Find the value of m.

12. Tom borrows \$44 000 from a bank at a simple interest rate of 5% per annum. If Tom repays the loan after t years and the bank charges him a simple interest of \$6600, find the value of t.

13. Edmond deposits \$$S$ in a bank at a simple interest rate of 2.6% p.a. He will receive a simple interest of \$1430 after 2.5 years.

(a) Write down an equation in S.

(b) Find the value of S.

14. Ian deposits a sum of money in a bank. The simple interest rate offered by the bank is 3.4% per annum. He gets a simple interest of \$425 per year.

(a) How much is the sum of money?

(b) How much will the amount be after 6 years?

15. Morris deposits \$31 500 in a bank. He will receive a simple interest of \$1575 after 10 years.

(a) Let r% be the simple interest rate per annum. Write down an equation in r.

(b) What is the simple interest rate per annum?

16. Roy deposits \$57 600 in a bank. He will receive a simple interest of \$1440 after 2 years.

(a) What is the simple interest rate per annum?

(b) How much will the amount be after 8 years?

17. A bank offers a simple interest rate of 0.9% p.a. Lawrence deposits \$70 000 in the bank and the amount will become \$73 780 after t years.

(a) Find the simple interest received.

(b) Find the value of t.

18. Ben deposits \$86 000 in a bank where the simple interest rate is 4.5% p.a. How long will it take to receive an amount of \$113 090?

19. Lambert puts \$176 000 in a bank. After 3 years, the amount will become \$181 280.

(a) How much will the simple interest be?

(b) Find the simple interest rate per annum.

20. Kate deposits \$$P$ in a bank in which the simple interest rate is 2.8% p.a. The amount will be \$62 700 after 5 years.

(a) Write down an equation in P.

(b) Find the value of P.

(c) Find the simple interest obtained.

21. A bank offers a simple interest rate of 1.2%. Candy deposits a sum of money in the bank and the amount will be \$23 600 after 15 years. How much simple interest will she receive?

22. A sum of money has been deposited in a bank at a simple interest rate of 3% p.a. for t years. The amount is \$7750 and the simple interest is \$1500 now.

(a) Find the principal.

(b) Find the value of t.

23. Nicolas deposits a sum of money in a bank. After 6.5 years, the bank will pay him a simple interest of \$5525 and the amount will become \$30 525. Find the simple interest rate per annum.

24. Eva deposits \$15 000 in bank A at an simple interest rate of 3.6% p.a. and \$24 000 in bank B at an simple interest rate of 1.5% p.a. at the same time.

(a) How much simple interest will she get two years later?

(b) Find the overall simple interest rate per annum.

(Give the answer correct to 1 decimal place.)

25. Banks A and B lend money at simple interest rates of 4% p.a. and 6.5% p.a. respectively. If a sum of money is borrowed for 2 years, the simple interest charged from bank B is \$15 000 more than that from bank A.

(a) Find the sum of money.

(b) If John borrows the sum of money from bank A for 2 years, find the simple interest charged.

26. Janet deposits a sum of money in a bank. If she deposits \$5000 less, the simple interest received each year will be \$80 less. Find the simple interest rate per annum.

27. A sum of money is deposited in a bank. After 5 years, the amount will become \$98 800, which is 4% more than the principal.

(a) How much is the sum of money?

(b) How long is required for the amount to become \$101 840?

28. Peggy deposits a sum of money in a bank. After 20 years, the amount will be 18% more than the principal and she will receive a simple interest of \$6480.

(a) Find the simple interest rate per annum.

(b) Find the amount received after 20 years.

29. Neo deposits \$70 000 in a bank. After 4 years, the amount received will be 9 times the simple interest received. Find the amount Neo will receive 4 years later.

30. A sum of money is deposited in a bank at a simple interest rate of 6% p.a. After how many months will the amount be twice as much as the principal?

31. Ricky deposits a sum of money in a bank at a simple interest rate of 4% p.a. If the simple interest rate per annum decreases to 1.5%, what is the percentage decrease in the simple interest received per annum?

32. A sum of money is deposited in a bank at a simple interest rate of 3% p.a. If the simple interest rate per annum increases to 4.5%, what will the percentage increase in the amount be after 20 years?

Compound Interest

If the amount got in each period is used as the principal for calculating the interest in the next period, the method of calculating interest used is called compound interest.

In general, if we deposit \$$P$ at an interest rate of r% per period and the interest is compounded at the end of each period, then the amount \$$A$ after n periods is given by:

$$A = P(1 + r\%)^n$$

The compound interest \$$I$ earned is given by: $I = A - P$

Exercise 2D

1. A sum of \$2000 is deposited at an interest rate of 5% p.a. for 3 years, compounded yearly. Find the amount and the interest.

2. Chris deposits \$8000 in a bank at an interest rate of 0.5% p.a. for 7 years, compounded yearly. Find the amount and the interest.

3. A sum of \$5000 is deposited at an interest rate of 2% p.a. for 3 years, compounded half-yearly.
   (a) **(i)** Find the number of periods in 3 years.
   (ii) Find the interest rate per period.
   (b) Find the amount and the interest.

4. A sum of \$48 000 is deposited at an interest rate of 6% for 5 years, compounded monthly.
   (a) **(i)** Find the number of periods in 5 years.
   (ii) Find the interest rate per period.
   (b) Find the amount and the interest.

5. Helen deposits \$20 000 in a bank at an interest rate of 8% p.a. for 2 years, compounded quarterly.
   (a) **(i)** Find the number of periods in 2 years.
   (ii) Find the interest rate per period.
   (b) Find the amount and the interest.

6. Emily deposits a sum of money in a bank for 2 years and the interest rate is 4% p.a., compounded yearly. If the amount received is \$70 304, find the sum of money deposited.

7. William borrows a sum of money from a bank at an interest rate of 20% p.a., compounded yearly. After 3 years, he has to repay \$14 688 to the bank.
   (a) How much does William borrow?
   (b) Find the compound interest that he has to repay.

8. Grace deposits a sum of money in a bank at an interest rate of 3% p.a., compounded monthly. She will receive an amount of $62 083 one year later.

(a) **(i)** Find the number of periods in one year.

(ii) Find the interest rate per period.

(b) Find the sum of money deposited, correct to the nearest dollar.

9. A sum of money is deposited in a bank at an interest rate of 4% p.a. for 2 years, compounded quarterly. If the amount received is $190 182, find the sum of money deposited, correct to the nearest dollar.

10. Calvin deposits $21 000 in a bank at an interest rate of 2% p.a. for 3 years. Find

(a) the simple interest obtained,

(b) the interest obtained compounded yearly.

11. A sum of $100 000 is deposited at an interest rate of 9% p.a. for 5 years. Find the difference between the simple interest obtained and the interest obtained compounded monthly.

12. Kitty deposits $63 000 in a bank at an interest rate of 6% p.a., compounded half-yearly.

(a) Find the amount she will get 2 year later.

(b) After 2 years, the interest rate will be changed to 4% p.a. and the interest will be compounded quarterly. Find the amount received 3 years after the change of the interest rate.

13. Judy deposits $8000 in a bank. The interest is compounded half-yearly. After 1 year, she will get interest of $160.8. Find the annual interest rate.

14. A sum of $20 000 is deposited at an interest rate of 10% p.a., compounded yearly.

(a) Find the interest earned in the first year.

(b) Find the interest earned in the second year.

15. Amy deposits a sum of money in a bank at an interest rate of 4% p.a., compounded half-yearly. The interest earned in the second year will be $3064.

(a) Find the sum of money that Amy deposits.

(b) Find the total interest earned over these two years.

(*Give the answers correct to the nearest dollar.*)

16. Adam deposits $\$P$ in a bank at an interest rate of 10% p.a., compounded yearly. After 3 years, he will receive interest of $17 212.

(a) Find the amount Adam will receive after 3 years in terms of P.

(b) Find the value of P.

17. A sum of money is deposited in a bank at an interest rate of 5% p.a. for 2 years, compounded quarterly. If the interest earned is \$10 200, find the sum of money deposited, correct to the nearest hundred dollars.

18. Mr Tang wants to deposit \$360 000 in a bank for 3 years. Bank *A* offers an interest rate of 3% p.a., compounded half-yearly.

(a) Find the amount Mr Tang will receive from bank *A*, correct to the nearest dollar.

(b) Bank *B* offers an interest rate of 2.98% p.a., compounded quarterly. Which bank should he choose in order to earn more interest? Explain your answer.

19. Mrs Chan wants to deposit \$70 000 in a bank for 4 years. The bank provides two savings plans for her to choose.

Plan *A*

- Interest rate of 3.6% p.a., compounded monthly.

Plan *B*

- Interest rate of 1% p.a., compounded yearly.
- Extra interest of \$8000 is paid in the 4th year.

Which plan should she choose to earn more interest? Explain your answer.

20. Anthony wants to deposit \$350 000 in a bank for 5 years. There are two plans for him to choose from.

Plan *A*: Compound interest at an interest rate of 5% p.a., compounded quarterly.

Plan *B*: Simple interest at an interest rate of 7% p.a. for the first year. In every subsequent year, compound interest at an interest rate of 4.5% p.a., compounded monthly.

(a) Find the amount that Anthony will receive after 5 years, correct to the nearest hundred dollars, if he chooses

(i) plan *A*, **(ii)** plan *B*.

(b) Which plan should Anthony choose to earn more interest?

21. A sum of money is deposited in a bank at an interest rate of 8% p.a., compounded yearly. Find the least number of whole years required to make the amount more than twice the principal.

22. Alex borrows a loan of \$500 000 from a bank at an interest rate of 24% p.a., compounded monthly. For each successive month after the day when the loan is taken, loan interest is calculated and then a monthly instalment of \$$x$ is immediately paid to the bank.

(a) **(i)** Express, in terms of x, the amount that Alex still owes the bank after paying the 1st instalment.

(ii) Show that if Alex has not yet fully repaid the loan after the 4th instalment, he still owes the bank \$(541 216.08 – 4.121 608x).

(b) Suppose that Alex fully repays the loan at the end of the 4th month.

(i) Find the value of x.

(ii) Find the total loan interest.

(*Give the answers correct to the nearest integer.*)

MC

1. When a value changes from 250 to 275, the percentage change is

   A. –10%. B. +10%.

   C. –25%. D. +25%.

2. When 4500 increases by 22%, the new value is

   A. –990. B. 990.

   C. 3510. D. 5490.

3. When a number decreases by 20%, it becomes 75. The original number is

   A. 60. B. 62.5.

   C. 90. D. 93.75.

4. When a number increases by 25%, it becomes 69. The original number is

   A. 51.75. B. 55.2.

   C. 86.25. D. 92.

5. When 405 decreases by 50% and then increases by 60%, the final value is

   A. 81. B. 243.

   C. 324. D. 972.

6. When a number decreases by 60% and then increases by 20%, it becomes 48. The original number is

   A. 25. B. 37.5.

   C. 100. D. 150.

7. Howard's income and expenditure were \$20 000 and \$15 000 respectively in June. He saved the remaining. In July, his income increased by 20% and his expenditure was decreased by 20%. In July, he saves

   A. \$5000. B. \$7000.

   C. \$800. D. \$12 000.

8. Mr. Chan invests a sum of money in a fund. He gains 20% in the first year and loses 5% in the second year and the third year respectively. The percentage change in Mr. Chan's investment over the three years is

   A. +8.3%. B. +10%.

   C. +19.7%. D. +32.3%.

9. A number increases by $y\%$ and then decreases by $x\%$. The final number is $r\%$ more than the original number. Find y in terms of x and r.

A. $y=\frac{100(r+x)}{100-x}$ B. $y=\frac{100(r-x)}{100+x}$

C. $y=\frac{100(x-r)}{100-x}$ D. $y=\frac{100(r+x)}{100+x}$

10. Mr. Cheung bought a valuable antique in 2010. Its value increased by 25% from 2010 to 2011 and further increased by 30% from 2011 to 2012. If the value of the antique increased by \$562 500 from 2011 to 2012, find the value of the antique increased from 2010 to 2011.

A. \$1 875 000 B. \$1 500 000

C. \$468 750 D. \$375 000

11. The monthly running cost of a company consists of 3 parts: rent, salary and other items. It is known that 50% of the cost is spent on rent, 30% on salary and 20% other items. If the expenditure of on the rent increases by 10%, the expenditure on other items increases by 30% and the monthly running cost increases by 14%, the percentage change in the expenditure on salary is

A. +0.1%. B. +10%.

C. +20%. D. +33%.

12. The ratio of the original length to the original width of a rectangle is 3 : 1. If the length and width of a rectangle increases by 30% and 40% respectively, its perimeter will increases by

A. 2.6%. B. 26%.

C. 32.5%. D. +35%.

13. An alloy consists of two elements A and B. In the alloy, 75% is element A and 25 % is element B by weight. A new alloy is formed by doubling the weight of element B in the original alloy. Find the percentage change in the proportion of element A in the alloys.

A. –15% B. –20%

C. –60% D. –80%

14. Wilson bought a gold coin for \$20 000 three years ago. The value of the gold coin increased by 20% each year. The present value of the gold coin is

A. \$28 000. B. \$28 800.

C. \$32 000. D. \$34 560.

15. A watch was worth \$40 000 at the beginning of 2012. Its value increased by 10% every half year. At the end of 2013, its value was

A. \$58 564.
B. \$53 240.
C. \$48 400.
D. \$44 000.

16. The number of new born babies in a city was 150 000 in 2012. The number of new born babies increased by 5% each year. The increase in the number of babies from 2012 to 2014 was

A. 7500.
B. 15 375.
C. 157 500.
D. 165 375.

17. Gloria bought a mobile phone for \$3600 one years ago. The value of the phone decreased by 5% every half year. The present value of the phone is

A. \$3249.
B. \$3420.
C. \$3780.
D. \$3969.

18. Grace joins a fitness program. Before joining the program, her weight was 72 kg. Her weight is expected to decrease by 4% each week after joining the program. The decrease in her weight after joining the program four weeks will be

A. 2.9 kg, *cor. to the nearest 0.1 kg.*
B. 10.8 kg, *cor. to the nearest 0.1 kg.*
C. 61.2 kg, *cor. to the nearest 0.1 kg.*
D. 84.2 kg, *cor. to the nearest 0.1 kg.*

19. The profit of a company increases by 18% each year. The profit of the company is \$380 000 this year. Find the profit of the company two years ago.

A. \$256 000, *cor. to 3 sig. fig.*
B. \$273 000, *cor. to 3 sig. fig.*
C. \$529 000, *cor. to 3 sig. fig.*
D. \$565 000, *cor. to 3 sig. fig.*

20. The value of a computer has decreased by 12% each year. It is known that the present value of the computer is \$7000. Find the value of the computer two years ago.

A. \$5420, *cor. to 3 sig. fig.*
B. \$5580, *cor. to 3 sig. fig.*
C. \$8780, *cor. to 3 sig. fig.*
D. \$9040, *cor. to 3 sig. fig.*

21. The height of a tree at 2012 and 2013 were 2 m and 2.5 m respectively. If the growth factor of the height of the tree remains unchanged in each subsequent year, find the height of the tree in 2015.
    A. 3.6 m
    B. 4.32 m, *cor. to 3 sig. fig.*
    C. 3.91 m, *cor. to 3 sig. fig.*
    D. 4.88 m, *cor. to 3 sig. fig.*

22. The value of a piano increased by 10% each year from 2011 to 2013. Then the value of the piano has increased by 8% in each subsequent year. If the value of the piano was $18 000 in 2011, find the value of the piano in 2015.
    A. $21 400, *cor. to 3 sig. fig.*
    B. $23 100, *cor. to 3 sig. fig.*
    C. $23 500, *cor. to 3 sig. fig.*
    D. $25 400, *cor. to 3 sig. fig.*

23. The value of a vase increases by 15% each year. If the value of the vase was $34 000 in 2012, find the increase in the value of the vase from 2013 to 2015.
    A. $12 609.75
    B. $17 709.75
    C. $39 100
    D. $51 709.75

24. The population of a city increases by 3% each year. The population of a city is 3 600 000 in 2014. The increase in the population from 2012 to 2015 is
    A. 236 000, *cor. to 3 sig. fig.*
    B. 288 000, *cor. to 3 sig. fig.*
    C. 315 000, *cor. to 3 sig. fig.*
    D. 401 000, *cor. to 3 sig. fig.*

25. The volume of water stored in a reservoir decreased by 2% each year from 2010 to 2013. After that, the volume of water stored decreases 1% in each subsequent year. If the volume of water stored is 480 000 m^3 in 2010, find the volume of water stored in 2016.
    A. 438 000 m^3, *cor. to 3 sig. fig.*
    B. 439 000 m^3, *cor. to 3 sig. fig.*
    C. 525 000 m^3, *cor. to 3 sig. fig.*
    D. 526 000 m^3, *cor. to 3 sig. fig.*

26. According to past record, the rainfall of an island decreased by 4% each year from 2011 to 2014. The rainfall was 3200 mm in 2014. If the percentage decrease in the rainfall remains unchanged, find the decrease in the rainfall of the island from 2011 to 2015.
    A. 241 mm, *cor. to 3 sig. fig.*
    B. 545 mm, *cor. to 3 sig. fig.*
    C. 3330 mm, *cor. to 3 sig. fig.*
    D. 3620 mm, *cor. to 3 sig. fig.*

27. The value of a car is expected to decrease by 11% each year. If the value of the car was \$600 000 in 2014, find the decrease in the value of the car from 2012 to 2014.
    A. \$74 200, *cor. to 3 sig. fig.*
    B. \$132 000
    C. \$157 000, *cor. to 3 sig. fig.*
    D. \$251 000, *cor. to 3 sig. fig.*

28. Mr Man's expenditure decreases by 5% each month from January to April this year. After that, his expenditure increases by 5% per month in the following three months. If his expenditure is \$8000 in January, find his expenditure in July.
    A. \$7540, *cor. to 3 sig. fig.*
    B. \$7920, *cor. to 3 sig. fig.*
    C. \$7940, *cor. to 3 sig. fig.*
    D. \$8000

29. A sum of \$2000 is deposited at an interest rate of 2.5% p.a. for 4 years, compounded half-yearly. The amount at the end of the fourth year is
    A. \$2102, *cor. to the nearest dollar.*
    B. \$2198, *cor. to the nearest dollar.*
    C. \$2209, *cor. to the nearest dollar.*
    D. \$2210, *cor. to the nearest dollar.*

30. A sum of \$90 000 is deposited at an interest rate of 3.2% p.a. for 3 years, compounded quarterly. The amount at the end of the third year is
    A. \$99 030, *cor. to the nearest dollar.*
    B. \$98 993, *cor. to the nearest dollar.*
    C. \$98 919, *cor. to the nearest dollar.*
    D. \$98 640, *cor. to the nearest dollar.*

31. Sam deposits \$88 000 in a bank is at an interest rate of 2.8% p.a. for 4 years, compounded quarterly. The total interest he will earn is

A. \$10 278, *cor. to the nearest dollar.*

B. \$10 391, *cor. to the nearest dollar.*

C. \$98 278, *cor. to the nearest dollar.*

D. \$98 391, *cor. to the nearest dollar.*

32. Ray deposits \$67 000 in a bank is at an interest rate of 2.4% p.a. for 2 years, compounded monthly. The total interest he will earn is

A. \$3255, *cor. to the nearest dollar.*

B. \$3274, *cor. to the nearest dollar.*

C. \$3291, *cor. to the nearest dollar.*

D. \$40 765, *cor. to the nearest dollar.*

33. A sum of money is deposited in a bank is at an interest rate of 3.6% p.a. for 5 years, compounded half-yearly. If the amount received is \$316 000, the sum of money deposited is

A. \$264 158, *cor. to the nearest dollar.*

B. \$264 368, *cor. to the nearest dollar.*

C. \$264 782, *cor. to the nearest dollar.*

D. \$377 716, *cor. to the nearest dollar.*

34. A sum of money is deposited in a bank is at an interest rate of 2% p.a. for 6 years, compounded quarterly. If the amount received is \$455 125, the sum of money deposited is

A. \$403 780, *cor. to the nearest dollar.*

B. \$404 138, *cor. to the nearest dollar.*

C. \$406 362, *cor. to the nearest dollar.*

D. \$430 870, *cor. to the nearest dollar.*

35. A sum of \$300 000 is deposited in a bank is at an interest rate of 3% p.a. for 2 years, compounded yearly. The interest earned in the second year is

A. \$900.

B. \$9000.

C. \$9270.

D. \$18 270.

36. A sum of \$200 000 is deposited in a bank is at an interest rate of 4% p.a. for 2 years, compounded quarterly. The total interest earned in the second year is

A. \$16 571, *cor. to the nearest dollar.*

B. \$8451, *cor. to the nearest dollar.*

C. \$8320, *cor. to the nearest dollar.*

D. \$8121, *cor. to the nearest dollar.*

37. A sum of \$50 000 is deposited in a bank. The interest is compounded half-yearly. After 1 year, an amount of \$51 005 will be got. Find the total interest earned in the second year.
    A. \$1025, *cor. to the nearest dollar*
    B. \$2010, *cor. to the nearest dollar*
    C. \$2030, *cor. to the nearest dollar*
    D. \$4122, *cor. to the nearest dollar*

38. Andy deposits a sum of money in a bank at an interest rate of 4.2% p.a., compounded monthly. After half year, he will receive interest of \$20 804. Find the amount of money that Andy deposits.
    A. \$20 372, *cor. to the nearest dollar*
    B. \$20 376, *cor. to the nearest dollar*
    C. \$982 034, *cor. to the nearest dollar*
    D. \$990 667, *cor. to the nearest dollar*

39. Leslie deposits a sum of money in a bank at an interest rate of 4.4% p.a., compounded quarterly. After 2 years, he will receive interest of \$5555. Find the amount of money that Leslie deposits.
    A. \$60 735, *cor. to the nearest dollar*
    B. \$61 080, *cor. to the nearest dollar*
    C. \$61 766, *cor. to the nearest dollar*
    D. \$67 043, *cor. to the nearest dollar*

40. Miss Chan borrows a sum of money from a bank at an interest rate of 8.4% p.a., compounded monthly. After 2 years, she will have to pay interest of \$20 204. Find the amount of money that Miss Chan borrows.
    A. \$139 434, *cor. to the nearest dollar*
    B. \$115 414, *cor. to the nearest dollar*
    C. \$111 949, *cor. to the nearest dollar*
    D. \$110 862, *cor. to the nearest dollar*