

## Percentage

### Conventional Questions

**1. [13-14 Standardized test 1]**

Susan decides to deposit \$10,000 in a bank for 2 years. Bank A offers a simple interest rate of 2% p.a. Bank B offers an interest rate of 1.8% p.a. compounded daily. Which bank should she choose so that she can earn more interest? Explain your answer. (Take 1 year = 365 days)

**(4 marks)**

**2. [13-14 Standardized test 1]**

The value of an antique cabinet increases at a rate of 15% per year. If its value is \$8,800 now, find its value

(a) 3 years ago.

**(2 marks)**

(b) 4 years later.

**(1 mark)**

**3. [13-14 Standardized test 1]**

If the base of a parallelogram is increased by 10% and its area has a percentage change of  $-10\%$ , find the percentage change in its height.

**(3 marks)**

**4. [13-14 Standardized test 1]**

At the beginning of the year 2010, the numbers of males and females in a city were in the ratio 6 : 7. Then the number of males decreases steadily at a rate of 5% while the number of females increases steadily at a rate of 8% every year. If the population of the city is 1,208,000 at the end of the year 2011, find the population of the city at the beginning of the year 2010.

**(3 marks)**

**5. [13-14 Mid-year Exam, 5]**

(a) Gigi deposits \$5,000 in a bank. If the annual interest rate is decreased from 7% p.a. to 5% p.a., find the decrease in the simple interest that Gigi obtains in 2 years. **(2 marks)**

(b) Helen deposits a sum of money in a bank. If the annual interest rate is increased from 5% p.a. to 7% p.a. compounded half-yearly, the compound interest obtained after 2 years will be increased by \$309. What is the sum of money she deposits in the bank? **(2 marks)**

**6. [13-14 Mid-year Exam, 6]**

The cost of making a cake is \$120, of which 25% is for raw materials, 65% is for wages and 10% is for other expenses. Now the costs of raw materials, wages and other expenses are increased by 20%, 15% and 5% respectively. Find the percentage change in the cost of making a cake.

**(3 marks)**

**7. [13-14 Mid-year Exam, 9]**

**Table 1** shows the salaries tax rate of each part of the net chargeable income for the financial year 2012/13. Thomas paid a salaries tax of \$13,501 in that year. If his salaries tax allowance was \$130,000, find his monthly income. **(3 marks)**

Net chargeable income	Tax rate
On the first \$40,000	2%
On the next \$40,000	7%
On the next \$40,000	12%

Remainder	17%
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**Table 1****8. [13-14 Mid-year Exam, 12]**

Compared with last year, the numbers of boys and girls in a school increase by 3% and 8% respectively this year.

- (a) If the total number of students increases by 5% this year, find the ratio of the number of boys to the number of girls of last year. **(3 marks)**
- (b) Hence, find the number of boys in this year if there were 2,000 students in the school last year. **(2 marks)**

**9. [13-14 Final Exam, 2]**

Joyce deposits \$50 000 in bank A at the interest rate of 4% p.a. compounded half-yearly.

- (a) Find the compound interest obtained after 1 year. **(2 marks)**
- (b) Joyce then deposits the amount obtained from bank A in bank B which offers a simple interest rate of  $r\%$  p.a. If the amount obtained is \$57 222 after the next 2 years, find the value of  $r$ . **(2 marks)**

**10. [13-14 S4 Mid-year Exam, 1]**

Sandy deposits \$10,000 in Bank A and \$20,000 in Bank B respectively for 1 year. Bank A offers a simple interest rate of 8% p.a. Bank B offers an interest rate of 6% p.a. compounded half-yearly.

- (a) Find the total interest Sandy gets at the end of the year. **(3 marks)**
- (b) If Sandy deposits all the \$30,000 in Bank C which offers an interest rate of  $x\%$  p.a. compounded half-yearly. The total interest she can get at the end of the year is \$430 more than that in (a). Find the value of  $x$ . **(2 marks)**

**11. [14-15 S4 Mid-year Exam, 2]**

A bank offers two saving plans as follows:

Plan A: Simple interest at 5% p.a.

Plan B: Compounded half-yearly at 4% p.a.

- (a) The annual income of Timothy was \$120 000 two years ago and it was increased by 10% every year. Find his annual income this year. **(2 marks)**
- (b) Timothy deposits \$30 000 in plan A and \$40 000 in plan B this year. After one year, find the amount he can obtain in total. **(3 marks)**

**12. [14-15 Mid-year Exam, 4]**

- (a) Alice's annual salary is \$180,000 this year. If her annual salary is increased by 5% in the coming year, and increased by 10% next year, find her annual salary after these two years. **(2 marks)**

- (b) Alice would like to deposit \$5,000 in a bank for 5 years by considering the following two plans.

*Plan A: Interest rate is 5% p.a. based on simple interest calculation.*

*Plan B: Interest rate of 4.5% p.a. is compounded yearly.*

- (i) Find the interest she can get from plan A after 5 years. (2 marks)

- (ii) Find the interest she can get from plan B after 5 years. (2 marks)

Give your answers correct to the nearest integer.

**13. [14-15 Mid-year Exam,5 ]**

There are 100 employers in a company. It is proposed that the number of employers has to increase by 25% every year for the coming 8 years and then decrease by 10% every year for the next 2 years after it.

- (a) How many employers are there in the company after 10 years? Give your answer correct to the nearest integer. (2 marks)

- (b) Rose claims that the overall percentage change in the number of employers in 10 years is more than 100%. Do you agree? Explain briefly. (2 marks)

**14. [14-15 Mid-year Exam,10]**

Lily deposits \$50,000 in a bank with an interest rate  $r$  % p.a. and the interest is compounded quarterly. After 5 years, she can get a total of \$60,000. Find the value of  $r$ . (2 marks)

**15. [14-15 Mid-year Exam,11 ]**

The base and the height of a parallelogram are in the ratio 5:4. If the base of the parallelogram is decreased by 20%, what should be the percentage change in the height of the parallelogram so that its area remains unchanged? (3 marks)

**16. [14-15 S.6 Mock Exam #5]**

Mabel wants to deposit \$ 60 000 for 3 years in a bank offering the following plan.

A simple interest at 4% p.a. with an additional rewards of \$800 for every \$10 000 deposit.

Find the amount Mabel can get after 3 years. (3 marks)

**17. [14-15 Final Exam #5]**

The depreciation rate of a mobile phone is 4% per month. It is known that the value of the mobile phone is \$5000 in June.

- (a) Find the value of the mobile phone in September of the same year. (2 marks)

- (b) Natalie bought the mobile phone in April and sold it in September of the same year. Find her loss in the trade. (2 marks)

**18. [15-16 Mid-year Exam #3]**

The population of a city increases by 3% every year. In 2014, the population was 70 000.

- (a) Find the population in 2016. (2 marks)

- (b) In 2014, the government gave \$500 to each person in the city. The government will give \$470 to each person in the city again in 2016. Find the percentage change of the total expenditure in 2016 when compared to that in 2014. (3 marks)

**19. [15-16 Mid-year Exam #8]**

**Table 1** shows the salaries tax rate of each part of the net chargeable income for the financial year 2014/15. Miss Ng's total annual income in this year is \$1 000 000. The only allowance for Miss Ng this year is the basic allowance \$120 000.

- (a) Find the salaries tax Miss Ng should pay this year. **(3 marks)**
- (b) The progressive rates shown in **Table 1** is only applicable when the salaries tax payable is less than the tax charged at standard rate (15%) of the total annual income. It is given that Miss Lee's total annual income is \$ $x$  and she only has the basic allowance of \$120 000. Find the range of  $x$  such that Miss Lee will be charged at standard rate.

**(2 marks)**

<b>Salaries tax based on the net chargeable income (2014/15)</b>	
<b>Net chargeable income</b>	<b>Tax rate</b>
On the first \$40 000	2%
On the next \$40 000	7%
On the next \$40 000	12%
Remainder	17%

**Table 1****20. [15-16 Mid-year Exam #11]**

Miss Kwok invests a sum of money at 5% p.a. simple interest for 2 years. Miss Mak deposits the same amount of money for the same period of time at an interest rate of 4%, but the interest is compounded half-yearly. The compounded interest received by Miss Mak is \$175.7 less than the simple interest received by Miss Kwok.

- (a) Find the principal Miss Kwok deposits, correct to the nearest integer. **(3 marks)**
- (b) If the simple interest rate becomes 4.1% p.a., who will receive more interest? Explain briefly. **(2 marks)**

**21. [15-16 S.4 Mid-year Exam #2]**

The salary \$y of Tom increased by 2% in the first year and then increased by 3% in the second year. Find the percentage change in Tom's salary over the whole period. **(3 marks)**

**22. [15-16 S.4 Mid-year Exam #3]**

Peter deposits \$20 000 in Bank A and \$35 000 in Bank B for 2 years respectively. Bank A offers a simple interest rate of 6% p.a. Bank B offers an interest rate of 4% p.a. compounded quarterly. Find the total amount Peter gets after 2 years. **(2 marks)**

**23. [15-16 Final Exam #3]**

The monthly rental income of a flat is \$6000. If the property tax rate is 15%, how much property tax should the owner pay for a year? **(2 marks)**

**24. [15-16 Final Exam #4]**

John wants to deposit \$10 000 in a bank for 5 years. Bank A offers an interest rate of 4% p.a. compounded half-yearly while Bank B offers 5% p.a. simple interest rate. If John wants to earn more interest, which bank should he deposit his money? Explain your answer. **(3 marks)**

**25. [16-17 S.3 Mid-year Exam #10]**

Amy owns a flat and she needs to pay a property tax of \$25 200 for a year. If the property tax rate is 15%, find the monthly rental income of her flat. **(2 marks)**

**26. [16-17 S.3 Mid-year Exam #12]**

Rebecca wants to save her \$2500 red packet money in a bank for 5 years. She can choose one of the following two saving plans.

Plan A: Simple interest rate 4.5% p.a.

Plan B: Compound interest rate 4% p.a. compounded quarterly.

(a) Which plan should she choose to get more interest? Explain your answer. **(3 marks)**

(b) After saving in the plan she chose in (a) for the first year, the bank introduces a new promotional saving plan C: compound interest rate 4.2% p.a. compounded half-yearly. The promoter claims that Rebecca will receive 5% more of interest for the whole 5-year period if she changes to Plan C for the remaining period of time. Do you agree? Explain your answer. **(3 marks)**

**27. [16-17 S.4 Mid-year Exam #3]**

Ady deposited \$10 000 each into bank A and bank B separately for 4 years. Bank A offers an interest rate at 5% p.a. compounded half-yearly. Bank B offers a simple interest rate at 6% p.a. Find the total interest obtained after 4 years correct to the nearest dollar. **(3 marks)**

**28. [16-17 S.3 Final Exam #1]**

The value of a computer is \$4096 now and its value depreciates 16% every year.

(a) Find the value of the computer two years later. **(2 marks)**

(b) Find the value of the computer two years ago. **(2 marks)**

**29. [16-17 S.3 Final Exam #12]**

Jane plans to invest a total of \$120000 in both Bank A and Bank B. Bank A offers 4% p.a. simple interest rate and Bank B offers 6% p.a. simple interest rate. Let  $x$  be the amount of money invested in Bank A. By setting up an inequality, what is the range of  $x$  that her total investment could still be guaranteed more than \$6500 interest per year? **(3 marks)**

**30. [17-18 S.3 Mid-year Exam #10]**

Sherry has borrowed \$50000 from a bank at the beginning of January in 2017. The interest is 12% p.a. compounded monthly. She repays \$10000 at the beginning of each month starting from February until she has fully repaid the whole sum of money.

- (a) Find the amount Sherry owes the bank at the end of January in 2017. **(2 marks)**  
(b) Find the amount Sherry owes the bank at the end of February in 2017. **(2 marks)**  
(c) Sherry thinks that she can fully repay the whole sum of money at the beginning of June in 2017. Do you agree with her? Explain your answer. **(2 marks)**

**31. [17-18 S.4 Mid-year Exam #3]**

Mrs Chan wants to invest \$50 000 for 3 years. She has the following choices:

Plan A: compounded quarterly at 2% p.a.

Plan B: simple interest of 2.05% p.a.

Suggest the plan she should choose by finding the interest. **(4 marks)**

**32. [17-18 S.4 Final Exam #4]**

The salary of Victoria is 10% higher than that of Joey while the salary of Joey is 20% lower than Pauline. It is given that the salary of Joey is \$15 000. Find the mean salary for these 3 people. **(3 marks)**