9. Ratio, Proportion and Rates of Change

Comparing job opportunities

Dhruv is looking at potential summer jobs in his seaside home town but is finding it difficult to decide which one would be best. He doesn't have a particular preference about what the job is as long as (1) he gets three full days off each week to see friends and family, (2) can save as much as possible for driving lessons and (3) can start to save towards his first car.

Using the information in the adverts on page 7, answer the following questions.

1. Dhruv is trying to compare the role in the local pub to the receptionist role. To do this he calculates the annual earnings of the waiter job as follows:

   £7.50 x six hours a day = £45

   £45 x four days per week = £180

   £180 x four weeks per month = £720

   £720 x 12 months per year = £8,640

   Comment on Dhruv's calculation and whether this offers an accurate comparison.

As there are not exactly four weeks in a month, it would be more accurate to calculate his weekly wages and times by 52. As he would be paid hourly he would likely not be paid if he was unable to work due to sickness or holiday, so this may lead to an over estimation of annual earnings.

2. After enquiring with the hotel for more information about the receptionist role, he finds out that if he has to work extra hours past his usual finish time or on bank holidays then he will receives overtime, which is paid at 50% more than standard hourly rate.

   a. What is the standard hourly rate for the receptionist role?

08:00 - 13:00 = 5 hours
Thursday - Sunday = 4 days a week
5 x 4 = 20 hours a week
20 x 52 = 1040 hours a year

(£18,000 / 2) = £9,000 / 1040 = £8.65

   b. Assuming Dhruv worked this role for six weeks over summer with the following shift pattern, what would you expect his total wage to be?

- Standard shifts: Thursday to Sunday 08:00 - 13:00.
- Averages two hours per week of overtime.
- Swaps a shift with a colleague and worked the August bank holiday Monday instead of a Thursday.

Annual salary = £9,000
£9,000 x (6/52) = £1,038.46 earnings for standard shifts
(Students could also calculate this using the hourly rate calculated in the previous question.

Overtime rate = (£8.65 x 1.5) = £12.98
2 x 6 = 12 hours of overtime
12 x £12.98 = £155.76

Bank holiday (swapped shifts - note this is not an extra shift)
5 x (£12.98 - £8.65) = £21.65

Total earnings = £1,215.86 (students may have a small difference based on their method of calculating the standard hours)

3. In which role could Dhruv expect to earn more: the park warden or selling boat trips? What questions do you think Dhruv should ask these employers to understand more about his potential earnings in these roles?

Park warden = £36 x 4 = £144 a week
Boat trip sales = 7% x (£12 x 15 x 12) = £151.20 a week when the weather is fine.

With the information given it is likely that the boat trip sales role offers a higher weekly wage. However, this is weather dependent so there could be periods of fewer trips or no boat trips at all.

Example questions for the employers (any sensible question accepted):

- what are the hours for the park warden role?
- what are the average number of boat trips per week/month during the actual season Dhruv plans to work?
- when the weather is poor would there be any other work available?

4. What are the expected weekly earnings for the cleaning role?

09:00 - 13:30 = 4.5 hours a day = 3 caravans
3 x £12.50 = £37.50
Wednesday - Saturday = 4 days a week
£37.50 x 4 = £150 a week

5. As a waiter, Dhruv can also expect to earn tips on top of his wages. Last summer, his friend in a similar role received on average £15 per evening shift and £8 per lunchtime shift in tips. If Dhruv typically worked three lunchtimes and one evening per week, what are Dhruv's total expected earnings over a six-week summer season?

6 x £7.50 = £45 per shift
£45 x 4 = £180 per week
£15 + (£8 x 3) = £39 per week in tips
£180 + £39 = £219
£219 x 6 = £1,314 total expected earnings

6. **[Higher]** Using the following assumptions, rank the roles based on their average hourly rate.

- Dhruv works the standard hours in the hotel plus four hours a week of overtime.
- The park warden needs to patrol the park four times a day and each patrol lasts approximately one hour.
- It typically takes one-and-a-half hours to sell enough tickets to fill a boat.
- Dhruv averages £46 per week in tips at the pub.

Boat trip sales: 7% x (£12 x 12) = £10.08 / 1.5 = **£6.72 an hour**

Cleaner: £12.50 / 1.5 = **£8.30 an hour**

Park warden = £36 / 4 = **£9 an hour**

Hotel: standard hourly rate = £8.65 for 20 hours a week
Overtime rate = £12.98
(£8.65 x 20) + (£12.98 x 4) = £224.92 / 24 = **£9.37 an hour**

Waiter: £7.50 x 6 x 4 = £180 a week + £46 tips = £226 / (6 x 4) = **£9.42 an hour**

7. **[Higher]** Using your answer to question six, if Dhruv decided to select the role with the highest average hourly wage, which job would he choose? Would he select the same job if he wanted to maximise his total earnings over the six weeks?

Based on average hourly wage he would select the waiter role at the local pub.

Boat trip sales: 7% x £12 x 12 x 15 x 6 = £907.20 (assuming fine weather)

Cleaner: £12.50 x 3 x 4 x 6 = £900

Park warden = £36 x 4 x 6 = £864

Hotel: £224.92 (from previous question) x 6 = £1,349.52

Waiter: £226 (from previous question) x 6 = £1,356

The waiting job also offers the highest total pay over the six weeks, although the tips would vary in reality, so this is not certain income.

In the UK, there are two taxes – income tax and national insurance – that you may have to pay on your earnings, depending on how much you earn. These tax rates (for the next tax year) are given below:

Income tax		
Annual earnings	Tax band	Tax rate
0 - £12,570	Personal allowance	0%
£12,570.01 - £50,270	Basic rate	20%
£50,270.01 - £150,000	Higher rate	40%
Over £150,000	Additional rate	45%

National insurance	
Monthly earnings	Tax rate
0 - £797	0%
£797.01 - £4,189	12%
Over £4,189	2%

8. **[Higher]** For a full-time hotel receptionist earning £18,000 a year, calculate how much tax and national insurance they would pay over the course of the year and what their monthly take home (after tax) pay is.

Income tax: (£18,000 - £12,570) x 20% = £1,086
National insurance: (£18,000 - (£797 x 12)) x 12% = £1,012.32

£18,000 - £1,086 - £1,012.32 = £15,901.68
£15,901.68 / 12 = £1,325.14 monthly take home pay

Job adverts

Job	Pay	Notes
Waiter at the local pub	£7.50 per hour	Six hour shift, four days a week (days and nights)
Hotel receptionist	£18,000 annual salary (50% part-time contract)	Thursday - Sunday 08:00 - 13:00
Caravan holiday cleaner	£12.50 per caravan cleaned	Assume that it takes one and a half hours to clean one caravan. 09:00 - 13:30, Wednesday - Saturday
Park warden	£36 per day	Monday - Thursday
Sales representative at a coastal boat tour company	7% commission on sales selling boat trips	£12 per person When the weather is fine, 15 boat trips are made a week, with approximately 12 customers on board.