

## Should I attend the BPP Introduction to financial maths course?

Attempt the 10 questions below and then check your answers on the next page. Try not to round your answers to less than 2 decimal places.

1. From the following set of numbers, what is the mean, the median and the mode?  
1,3,5,5,8,10,11
2. What is the 5<sup>th</sup> root of 100?
3. What is the average annual rate of inflation, if the past three years have seen inflation running at 3%, 5% and 8% per year?
4. If you saw the following calculation written down, what do you think the answer should be?  
 $10 + 3 \div 2 + 5 \times 8$
5. If you are charged 2% every quarter on a loan, what is the effective annual rate of interest?
6. You deposit £50 in a bank account paying 1% interest a year. What is in the account five years later if you do not make any further additions or withdrawals?
7. What is the present value of £1,000, if it is to be received in four years' time. The current interest rate is 6%.
8. You have a 40% chance of making a 10% return, and a 60% chance of losing 5% of your money. What is your expected percentage return?
9. What is the percentage return on an investment if you bought it a year ago for £95, if it is now worth £102 and has just paid out a dividend of £3?
10. An investment has a high standard deviation of historic returns. Would you class this investment as relatively high risk or relatively low risk?

## Answers

1. The mean is the average, and for number that are not percentages, we would assume an arithmetic mean (i.e. add them up and divide by the number of items). The mean is  $(1 + 3 + 5 + 5 + 8 + 10 + 11)/7 = 6.14$ .

The mode is the most frequently occurring item, in this case 5. The median is the middle ranking item, when arranged in order. For a set of seven items, the middle ranking item is ranked number four. So the median is also 5.

All three answers to be correct to score the mark for this question.

2. The 5<sup>th</sup> root is 2.51, meaning that you multiply 2.51 by itself 5 times to get 100. Different calculators do this in different ways, but it is common to press 5 then the shift key followed by the power button, then to type in 100.
3. When working with percentages, you are usually wanting a geometric mean. When those percentages relate to a growth rate (such as inflation or a percentage return), we work with "1 plus the percentage". For the geometric mean you multiply the three values together then take the 3<sup>rd</sup> root. The answer we need is what follows the 1, i.e. 5.3%.

$$1 + \text{inflation} = \sqrt[3]{(1.03 \times 1.05 \times 1.08)} = 1.053$$

If you put 5% (arithmetic mean) that is not the correct answer.

4. The strict "BODMAS" order has to be applied (remember that from school?), meaning in this context that dividing (D) and multiplying (M) must be done before adding (A) and subtracting (S). So effectively we are doing  $10 + 1.5 + 40 = 51.5$

If you are wondering about the B and the O, the B is for brackets, meaning that you must do a calculation in the bracket first; and O is for order, which is another word for a power (square or square root for example).

5. The 2% will be compounded every quarter, meaning that effectively we are being charged interest on interest four times in the year. So we cannot just multiply 2% by four, we have to apply a factor of 1+ interest, multiplied by itself four times to see what the interest feels like over a year.

$$1 + \text{effective interest} = (1.02)^4 = 1.0824$$

The annual interest rate is 8.24%.

6. The £50 deposit collects 1% per year, which means that it ends each year a multiple of 1.01 bigger than it started it. Over five years the £50 will grow to  $50 \times 1.01^5 = £52.55$ .

7. Working out the present value means that you have to "discount out" the interest that you would have received on the money if you had received it now. So we divide the £1,000 by  $(1.06)^4 = £792.09$ .

8. We take a weighted average of the two outcomes, based on how likely they are. The expected value is  $40\% \times 10\% + 60\% \times -5\% = +1\%$ .

9. The percentage return is calculated based upon how much you got back (capital gain of £7 and dividend of £3) as a percentage of how much you invested.

$$\text{Return} = (7+3)/95 = 10.53\%$$

10. A high standard deviation indicates that there is a lot of variation in the returns around the average. This is like saying that you could make a big return or you could lose money. This is by definition a relatively risk investment. Standard deviation is the industry standard description of riskiness (volatility).

## What to do now?

If you scored **8-10**, you may just need to brush up on the odd area, but no need to come in on a course.

If you scored **6-7**, we would recommend that you work through the online maths modules and consider coming to the 1-day financial maths course.

If you scored **5 or less** we would strongly recommend that you attend the 1-day maths course, as it will build confidence and allow you to focus on the maths concepts before they are put into the context of the financial markets in your main classroom or distance learning course.

To book a place on the financial maths course, please go to [www.bpp.com/financialservices](http://www.bpp.com/financialservices) or contact customer services on 020 8746 4178

For those looking for user-friendly practical book on basic financial maths we recommend An introduction to Financial Mathematics which introduces the mathematical issues that you will require when developing the investment and finance ideas. All the techniques discussed are fully illustrated and performed manually.

To order a copy of our City Essentials – Introduction to Financial Mathematics please go to <http://www.bpp.com/learningmedia/financial-services/city-essentials/default.asp>