Bishop Challoner School

Mathematics

Sample Questions for Year 10 (14+)

(Current Year 9)

Information:

- The questions are meant to give a taster of the types of questions you will have to answer in the entrance examination.
- Please note that this is not meant to be comprehensive regarding the topics that could appear on the entrance paper, rather this is meant to provide a guide.
- Marks for each question are shown in brackets after the question.
- Calculators are NOT allowed

Advice:

- Read each question carefully before you start to answer it.
- Make sure you show all stages of your working out.
- For some questions, you will find it useful to use short phrases to help ensure your working out and methods used clear.
- Do not use a calculator when doing these questions.
- If appropriate, make sure you include your units.

1. Calculate the answers to the following:

(a) $157 + 781$ (2)

(b) $455 - 123$ (3)

(c) $56 + 52 - 12$ (3)

(d) 53×24 (3)

(e) $782 \div 17$ (3)

(f) 127×354 (3)

2. Calculate the answers to the following:

(a) -7×-2 (1)

(b) 8×-9 (1)

(c) $-9 + (-3)$ (1)

(d) $9 - (-3)$ (1)

€ $-12 \div -3$ (1)

(f) $(-2)^2$ (1)

3. (a) Express 42 km in metres. (1)

(b) Express 89 cm in metres. (1)

(c) Express 1.5 km in cm. (1)

4. Jack has 36 sweets and gives 12 of them to his brother. What fraction of the sweets does he keep? Write your answer in its simplest form.

(3)

5. Write each of the following amounts to the nearest hundred pounds:

(a) £325

(1)

(b) £2955

(1)

(c) £10 035

(1)

(d) 8950p

(2)

6. Write down the first 5 multiples of 6.

(1)

7. What is the third prime number?

(1)

8. What is the eleventh square number?

(1)

9. Write down 75% as a fraction and a decimal.

(1)

10. A rectangle has an area of 36.8 cm^2. If the width is 4 cm, what is the length? Hence find perimeter of the rectangle.

(4)

11. A triangle has a perpendicular height of 4.2 cm and a base length of 5.0 cm. Find the area.

(3)

12. Richard scores 84 out of 120 in a test. What percentage did he get in the test?

(2)

13. Calculate the answer to the following, giving your answer in its simplest form.

(a) $\frac{2}{3}+\frac{3}{4}$

(2)

(b) $\frac{3}{4}-\frac{2}{3}$

(2)

(c) $\frac{9}{14}\times\frac{16}{27}$

(3)

(d) $\frac{8}{9}\div\frac{4}{3}$

(4)

14. A plane leaves Heathrow Airport at 19:15 on Tuesday for Tokyo. If the flight time takes 11 hours 35 minutes and Tokyo is 8 hours ahead of London, at what time and day does it land in Tokyo?

(3)

15. Solve the following equations, giving your answer as a fraction in its simplest form where appropriate.

(a) $3x-2=4$

(2)

(b) $5x=2x+9$

(2)

(c) $9x-3=3x+5$

(3)

(d) $3(2x-4)=30$

(3)

16. Simplify the following algebraic expressions.

(a) $t+t+t+t$

(1)

(b) $y\times y$

(1)

(c) $2\times 3g$

(1)

(d) $2w+3w$

(1)

(e) $4t-2t$

(1)

(f) $9g\times 3g$

(1)

17. William jogs at 2 metres per second. How far does he jog in 12 minutes?

(3)

18. Complete the following table showing equivalent decimals, fractions and percentages. Write all fractions in their simplest form.

Decimal	Fraction	Percentage
0.4		
	$\frac{1}{4}$	
		80%

(6)

19. Calculate the answers to the following, making sure that you show all stages of your working out.

(a) $4-9(9-3)$

(2)

(b) $4\times 81\div 9$

(2)

(c) $5\times 3(6-1)-32\div 2$

(3)

(d) $9+3(8-2)\times 4\div 6$

(4)

20. For each of the following, calculate the answer, giving your answer as a fraction in its simplest form.

(a) $2\frac{3}{4}\times\frac{10}{33}$

(3)

(b) $\frac{5}{18}\div 3\frac{1}{3}$

(4)

21. The original price of a duvet is £190 in a departmental store. The store decides to reduce all prices by 35%.

(a) What is the price of the duvet in the sale?

(3)

(b) The store decides to reduce prices by a further 10%. What is the price of the duvet now?

(2)

22. Simplify the following expressions:

(a) $4(2x-3)$

(2)

(b) $3x^4 \times 9x^3$

(2)

(c) $27g^3 \div 3$

(2)

23. Alison has some sweets. She keeps half for herself and shares the rest between her sister and her brother in ratio of 5:3 respectively. If her brother received 15 sweets, how many sweets did Alison start with?

(3)

24. Given that $a=3$, $b=5$ and $c=-6$, calculate the value of each expression below. You must show all your working.

(a) $2a+3b$

(2)

(b) c^2

(2)

(c) $2a^3-2b^2+2c$

(3)

25. A golfer has a mean score of 61 shots per round over 10 rounds. If he scores 83 in his eleventh round, what is his mean number shots per round for all eleven rounds?

26. If $x^2=144$, what are the possible values of x?

(2)

27. Calculate the answers to the following:

(a) $9.56 \div 0.4$

(3)

(b) 23.6×4.3

(3)

28. Write down the next two terms for each of the sequences below.

(a) 2, 6, 10, 14, …

(2)

(b) 2, -4, 8, -16, …

(2)

(c) 1, 3, 4, 7, 11, …

(2)

29. If $9.3 \times 1.7 = 15.81$, write down the answers to the following:

(a) 93×14

(b) $15.81 \div 0.93$

(c) 0.17×0.93

30. A Bank pays an interest rate of 4.5% per year for current accounts, on any amount up to £1500. If a customer invests £1800, how much money will they earn after one year?

31. If $25^{\frac{1}{2}} = 5,$ calculate the answers to the following:

(a) $9^{\frac{1}{2}}$

(1)

(b) $\left(25^{\frac{1}{2}}\right)^3$

(2)

32. A football club charges £25 per adult and £15 per child for an away football match. The club sells 6000 tickets, 5000 of which are adults. Given the additional information below, calculate the profit (or loss) that the club makes.

Coach: £3000 for every 500 peple (adult or child)

Tickets: £18 per adult
£12 per child

(6)

33. Expand and simpifly the following:

(a) $(x+3)(x+5)$

(2)

(b) $(x-4)(x+5)$

(2)

(c) $(x^2-4)(x+5)$

(2)

(d) $3(x-4)(x+5)$

(3)

(e) $(x-4)(x-4)$

(2)

(f) $(x-3)(x+4)(x-5)$

(5)

34.

2, _____, _____, 20, …

(a) Find the missing terms of the sequence above.

(2)

(b) Find the *n*th term of the sequence.

(2)

(c) Find the 36^{th} term in the sequence.

(2)

35. A triangle has a length of 6 cm and an area of 25.5 cm^2. Find the perpendicular height of the triangle. You must state your units in your final answer.

(3)

36.

(a) Express 756 as a product of prime factors.

(2)

(b) If $168 = 2^3 \times 3 \times 7$, find the HCF of 756 and 168.

(2)

(c) If $168 = 2^3 \times 3 \times 7$, find the LCM of 756 and 168.

(2)

37. Factorise each of the expressions below.

(a) $10x - 25$

(1)

(b) $15x^2 - 25xy$

(2)

(c) $x^2 - 10x + 25$

(2)

(d) $x^2 + x - 30$

(2)

(e) $x^2 - 16$

(2)

38. Jack thinks of a number, multiplies it by 3 and subtracts 9. The result he gets is 30. Let Jack's number be x.

Write an equation in terms of x and solve it to find Jack's number.

(4)

39. A sphere made of gold has a density of 19.3 g/cm^3 and has a mass of 2.2 kg. By using suitable approximations, find the volume.

(3)

40. The ratio of the interior angle to the exterior angle of a regular polygon is 8:1. How many sides does the polygon have?

(3)

Answers to Sample Questions

1.

(a) 938
(b) 332
(c) 96
(d) 1272
(e) 46
(f) 44958

2.

(a) 14
(b) -72
(c) -12
(d) 12
(e) 4
(f) 4

3.

(a) 42 000 m
(b) 0.89 m
(c) 150 000 cm

4. $\frac{2}{3}$

5.

(a) £300
(b) £3000
(c) £10 000
(d) £100

6. 6, 12, 18, 24, 30

7. 5

8. 121

9. Decimal: 0.75

Fraction: $\frac{3}{4}$

10. Length is 9.2 cm
Perimeter is 26.4 cm

11. 10.5 cm^2

12. 70%

13.

(a) $\frac{17}{12}$

(b) $\frac{1}{12}$

(c) $\frac{8}{21}$

(d) $\frac{2}{3}$

14. 18:50 on Wednesday

15.

(a) $x = 2$

(b) $x = 3$

(c) $x = \frac{4}{3}$

(d) $x = 7$

16.

(a) $4t$
(b) y^2
(c) $6g$
(d) $5w$
(e) $2t$
(f) $27g^2$

17. 1440 m

18.

$\frac{2}{5}$ 40%

0.25 25%

0.8 $\frac{4}{5}$

19.

(a) -50
(b) 36
(c) 59
(d) 21

20.

(a) $\frac{5}{6}$

(b) $\frac{5}{18}$

21.

(a) £123.50
(b) £111.15

22.

(a) $8x-12$
(b) $27x^7$
(c) $9g^3$

23. 80 sweets

24.

(a) 21
(b) 36
(c) -8

25. 63 shots per round

26. -12 and 12

27.

(a) 23.9
(b) 101.48

28.

(a) 18, 22
(b) 32, -64
(c) 18, 29

29.

(a) 1581
(b) 17
(c) 0.1581

30. £67.50

31.

(a) 3
(b) 125

32. £8 000

33.

(a) $x^2+8x+15$
(b) x^2+x-20
(c) $x^3+5x^2-4x-20$
(d) $3x^2+3x-60$
(e) x^2-16
(f) $x^3-4x^2-17x+60$

34.

(a) 8, 14
(b) $6n-4$
(c) 212

35. 8.5 cm

36.

(a) $2^2\times3^3\times7$
(b) 84
(c) 1512

37.

(a) $5(x-5)$
(b) $5x(3x-5y)$
(c) $(x-5)(x-5)$ or $(x-5)^2$
(d) $(x+6)(x-5)$
(e) $(x-4)(x+4)$

38.

$3x-9=30$

$x=7$

39. 110 cm^3

40. 18 sides