Linear equations (Senior UKMT)

These questions must be attempted without a calculator

Topics covered in the questions below may not necessarily be from the topic of the title.

1. Annakin Skywalker and Obi-Wan Kenobi each has some coins in his pocket. If Annakin gave Obi-Wan Kenobi one coin then Obi-Wan Kenobi would have twice as many coins as Annakin, but if Obi-Wan Kenobi gave Annakin one coin, they would each have the same number of coins.

Altogether, how many coins do they have?

A 8

B 10

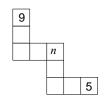
C 12

D 14

E 16

2. The digits 1, 2, 3, 4, 5, 6, 7, 8, and 9 are to be written in the squares so that every row and every column of three squares has a total of 13. Two numbers have already been entered.

What is the value of *n*?



A 2

B 4

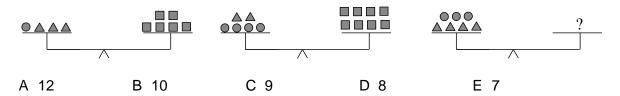
C 6

D 7

E 8

3. The first two scales shown are perfectly balanced.

How many squares will be needed on the right of the third scales so that the scales balance?



4. Sam and Pat were counting their money. They discovered that if Sam gave Pat £5, then Pat would have 5 times as much as Sam, but if Pat gave Sam £5, then Sam would have 5 times as much as Pat.

How much did they have altogether?

A £10

B £15

C £20

D £25

E £30

5. If 6x - y = 21 and 6y - x = 14, what is the value of x - y?

A 1

B 2

C 3

D 4

E 5

6. The difference between two numbers is one quarter of their sum.

What is the ratio of the smaller number to the larger number?

A 3:8

B 1:2

C 5:7

D 1:4

E 3:5

7.	Three consecutive even numbers are such that the sum of four times the smallest and twice the largest exceeds three times the second by 2006.						
	What is the sum of the digits of the smallest number?						
	A 8	B 11	C 14		D 17	E 20	
8.	I have a ten volume collection of mathematical puzzles. Each volume contains the same number of puzzles and the puzzles are numbered consecutively throughout (so, for example, the number of the first puzzle in volume 2 is one more than that of the last puzzle in volume 1). Whilst browsing one night, I was particularly intrigued by puzzle number 351 in volume 5 and puzzle number 689 in volume 8.						
	How many puzzles are there in each volume?						
	A 70	B 71	C 85	D 87	E more	information needed	l
9.	Five peaches, three oranges and two melons cost £3.18. Four peaches, eight orang and three melons cost £4.49.						
	How much more expensive is a peach than an orange?						
	A 8p	В 7р	C 6p	D 5p	E more info	ormation needed	
10.	In triangle PQR , angle $P=90^{\circ}$, $PR=15$ cm and $QR=17$ cm. Circular arcs are drawn with centres at P , Q and R , and each arc touches the other two arcs.						
	What is the radius of the arc with centre R?						
	P 15 cm R						
	A 10 cm	B 10.5 cm	C 11 c	m	D 11.5 cm	E 12 cm	
11.	A circle is inscribed in an equilateral triangle. Small circles are then inscribed in each corner as shown. What is the ratio of the area of a small circle to that of the large circle?						
	A 1:3	B 1:4.5	C 1:3	√3	D 1:6	E 1:9	
12.	A tennis club has <i>n</i> left-handed players and 2 <i>n</i> right-handed players, but in total there are fewer than 20 players. At last summer's tournament, in which every player in the club played every other player exactly once, no matches were drawn and the ratio of the number of matches won by left-handed players to the number of matches won by right-handed players was 3:4. What is the value of <i>n</i> ?						

C 5 D 6 E more information needed

A 3

B 4