The effluent solid has the following particle size distribution:

Cumulative mass undersize (%):	100	92	80	62	48	31	18	8	4	0
Particle diameter (μm):	90	80	70	60	50	40	30	20	10	0

If the initial concentration of the effluent before settling was 60 mg l^{-1}, the concentration of solids below the size calculated in your answer in question 7 (the critical size) is (mg l^{-1}):

a: 60 b: 43.2 c: 34.2 d: 25.8

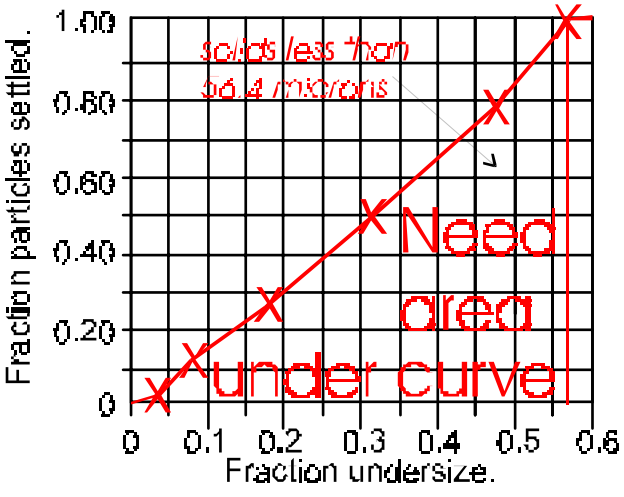
This represents a 'worst case' estimate of the concentration in the effluent discharge after settling as it assumes that no solids smaller than the critical size settle in the allowed time.

Of the concentration of solids below the critical size a considerable fraction will also have settled out. The amount settled out at each particle diameter is proportional to the ratio of its settling velocity compared to the velocity of the critical particle. For example, a particle with a settling velocity half that of the critical particle will travel 2.5 m in the allowed 30 minutes and, if we assume the suspension was homogeneous before settling, half of the solids at that diameter will settle out. Complete the following table:

note that for the sake of brevity the 0 has been dropped before the decimal point:

Particle diameter (μm):	90	80	70	60	56.4	50	40	30	20	10	0
Fraction settled at size	1.00	1.00	1.00	1.00	1.00	.79	.50	.28	.13	.03	0
Fraction undersize:	1.00	0.92	0.80	0.62	0.57	.48	.31	.18	.08	.04	0

Now, to estimate the amount of material settled below the critical size a plot of fraction of particles settling in allowed time against fraction of material undersize is made and the area under the curve is calculated by graphical means. Plot these below.



The area under the curve is:

a: 0.133 b: 0.265 c: 0.53

This represents the fraction of the total distribution below the critical size but which still settles because the particles still reach the base of the vessel in 30 minutes. Add this fraction to the fraction of material in the size distribution above the critical size (which has all settled out). See your answer to Q. 8 to help you find this. NB the next question does not want the fraction settled - it does want an effluent concentration going to discharge.

Hence, the concentration of the settled effluent discharge is (mg l^{-1}):

a: 9.1 b: 43.2 c: 34.2 d: 18.3

if you get the answer in blue it may be because you have calculated the amount **settled** per litre - not the amount left in suspension!