Answers

Non-calculator Overlap questions November 2017 Paper 1

20/1 Work out the value of $\frac{3^7 \times 3^{-2}}{3^3}$

$= \frac{3^5}{3^3} = 3^2 = 9$

9

(2)

21/2 $v^2 = u^2 + 2as$

$u = 12 \quad a = -3 \quad s = 18$

(*a*) Work out a value of v.

$v^2 = 12^2 + (2 \times -3 \times 18)$

$v^2 = 144 + -108$

$v^2 = 36$

$v = \sqrt{36} = 6$

6

(2)

(*b*) Make s the subject of $v^2 = u^2 + 2as$

$v^2 = u^2 + 2as$

$v^2 - u^2 = 2as$

$\frac{v^2 - u^2}{2a} = s$

$s = \frac{v^2 - u^2}{2a}$

(2)

23/4 It would take 120 minutes to fill a swimming pool using water from 5 taps.

(*a*) How many minutes will it take to fill the pool if only 3 of the taps are used?

1 tap $= 5 \times 120$

$= 600$ minutes

3 taps $= 600 \div 3$

$= 200$ min

200 minutes

(2)

(*b*) State one assumption you made in working out your answer to part (a).

All taps fill at the same rate

(1)

22/3 A bonus of £2100 is shared by 10 people who work for a company.
40% of the bonus is shared equally between 3 managers.
The rest of the bonus is shared equally between 7 salesmen.
One of the salesmen says,

"If the bonus is shared equally between all 10 people I will get 25% more money."

Is the salesman correct?
You must show how you get your answer.

All Salesmen = 60% of 2100
= 210 × 6
= 1260

Each salesman = 1260 ÷ 7
= £180

$$7\overline{)1^{1}2^{5}60}\quad 0\,1\,8\,0$$

All equal shares = 2100 ÷ 10
= £210

180 + 25%
= 180 + 45
= £225 if true

£210 is ~~not~~ 25% more.

(5)

24/5 A plane travels at a speed of 213 miles per hour.

(*a*) Work out an estimate for the number of seconds the plane takes to travel 1 mile.

200 miles : 1 hour) ×60
200 miles : 60 min) ×60
200 miles : 3600 sec
1 mile : $\frac{3600}{200}$
1 mile : 18 sec

18 seconds

(3)

(*b*) Is your answer to part (*a*) an underestimate or an overestimate?
Give a reason for your answer.

Real calc = $\frac{3600}{213}$ which would be smaller so its an overestimate

(1)

25/6 Solve the simultaneous equations $5x + y = 21$ ×3, $x - 3y = 9$ ×1

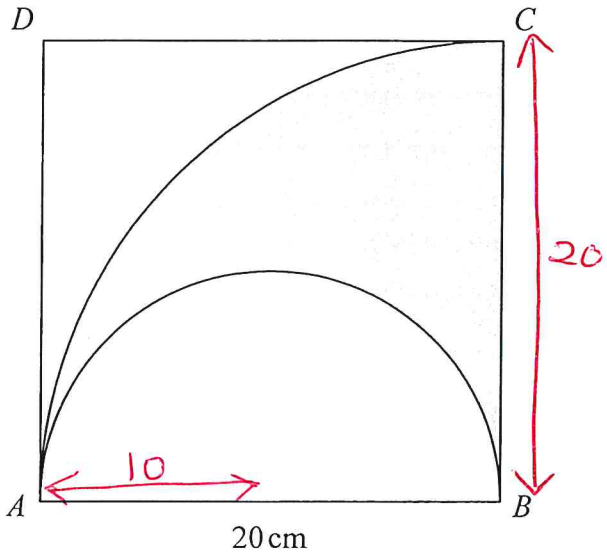
$$15x + 3y = 63$$
$$+ \quad x - 3y = 9$$
$$16x = 72$$
$$x = \frac{72}{16} = \frac{36}{8} = \frac{18}{4} = \frac{9}{2} = 4.5$$

$$x - 3y = 9$$
$$4.5 - 3y = 9$$
$$-3y = 4.5$$
$$y = \frac{4.5}{-3} = -1.5$$

$x =$ 4.5 $y =$ −1.5

(3)

26/7 The diagram shows a square *ABCD* with sides of length 20 cm.
It also shows a semicircle and an arc of a circle.



AB is the diameter of the semicircle.
AC is an arc of a circle with centre *B*.

Show that $\dfrac{\text{area of shaded region}}{\text{area of square}} = \dfrac{\pi}{8}$

Square $= 20 \times 20 = 400$

semicircle $= \dfrac{\pi \times 10^2}{2} = \dfrac{100\pi}{2} = 50\pi$

quarter circle $= \dfrac{\pi \times 20^2}{4} = \dfrac{400\pi}{4} = 100\pi$

Shaded area $= 100\pi - 50\pi = 50\pi$

$\dfrac{\text{Shaded}}{\text{square}} = \dfrac{50\pi}{400} = \dfrac{\pi}{8}$

(Total for Question is 4 marks)

TOTAL FOR PAPER IS 25 MARKS