Test answers - Straight-line graphs

Year: Year 8 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. Gradient = change in y ÷ change in x (1 mark for the method): $\frac{11-3}{6-2}=\frac{8}{4}=$**2** (1 mark). For each step of 1 to the right the line goes up 2.
b. Rewrite $y=5-2x$ in the form $y=mx+c$: $y=-2x+5$. The gradient is the number multiplying x, -2, and the y-intercept is **5**. (1 mark)
c. The point $(0,-4)$ is on the y-axis, so the intercept is -4. With gradient 3 the equation is $y=3x-4$. (1 mark)

Check (a): the line $y=2x-1$ passes through both points, since $2\times 2-1=3$ and $2\times 6-1=11$.

Answer to Question 2 (4 marks)

a. Substitute each x value into $y=2x-3$: $x=-1$ gives $-2-3=-5$; $x=0$ gives -3; $x=1$ gives -1; $x=2$ gives 1; $x=3$ gives 3. The y values are $-5,-3,-1,1,3$. (1 mark for at least three, 2 marks for all five)
b. Substitute $x=5$: $y=2\times 5-3=7$. The point would need y = 7, not 8, so **no**, (5, 8) is not on the line; it lies just above it. (1 mark)
c. Parallel lines have the same gradient, so the gradient is 2. The line passes through $(0,6)$, so the intercept is 6: $y=2x+6$. (1 mark)

The y values rise by 2 each time, which matches the gradient.

Answer to Question 3 (4 marks)

a. The midpoint is the mean of the coordinates. x: $\frac{-3+5}{2}=1$ (1 mark). y: $\frac{2+(-6)}{2}=-2$ (1 mark). The midpoint is $(1,-2)$.
b. Gradient $=\frac{-6-2}{5-(-3)}=\frac{-8}{8}=-1$. The line slopes down from left to right. (1 mark)
c. The equation has the form $y=-x+c$. Substitute A$(-3,\,2)$: $2=-(-3)+c=3+c$, so $c=-1$. The equation is $y=-x-1$. (1 mark)

Check with B(5, -6): $-5-1=-6$. Check with the midpoint: $-1-1=-2$. All three points satisfy the equation, so the working is consistent.

Answer to Question 4 (4 marks)

a. Each cost is a fixed charge plus a daily rate times d: $C = 6d + 10$ for the first shop and $C = 8d + 4$ for the second. (1 mark)
b. Set the costs equal: $6d + 10 = 8d + 4$ (1 mark). Subtract $6d$ from both sides: $10 = 2d + 4$. Subtract 4: $6 = 2d$, so $d = 3$ days (1 mark).
c. For 5 days: first shop $6 \times 5 + 10 = £40$, second shop $8 \times 5 + 4 = £44$. The **first shop** is cheaper, by £4. (1 mark)

Check (b): at 3 days both cost £28. On a graph the two straight lines cross at (3, 28); after that point the steeper line, the second shop, is above, so it costs more.

Answer to Question 5 (4 marks)

a. For n films the first club costs $C = 4n + 15$ and the second costs $C = 7n$, a line through the origin. (1 mark)
b. Set them equal: $4n + 15 = 7n$ (1 mark). Subtract $4n$: $15 = 3n$, so $n = 5$ films (1 mark). Both cost £35 at that point.
c. For 8 films: first club $4 \times 8 + 15 = 32 + 15 = £47$; second club $7 \times 8 = £56$. The **first club** is cheaper, by $56 - 47 =$**£9**. (1 mark)

For fewer than 5 films the club with no joining fee is cheaper. Maya plans more than 5 films, so the joining fee is worth paying, and each extra film saves her another £3.