

علاوة على هذا
77113376

حلول رياضيات تانية ثانوي
الفصل الاول

1. $4y^2 - 5x^2 = r^2$

اضافة $5x^2$ للطرفين
 $4y^2 = r^2 + 5x^2$

القسمة على 4
 $y^2 = \frac{r^2 + 5x^2}{4}$
اكتب الطرفين للطرفين

$y = \pm \sqrt{\frac{r^2 + 5x^2}{4}}$

2. $6y - 4x = 5 + 2xy$

طرح $2xy$ من الطرفين

$6y - 2xy - 4x = 5$
اضافة $4x$ للطرفين

$6y - 2xy = 4x + 5$
عامل مشترك

$y(6 - 2x) = 4x + 5$
القسمة على $(6 - 2x)$

$\therefore y = \frac{4x + 5}{6 - 2x} \quad x \neq 3$

3. $x(2y + 6m) = 12 - y$

$2xy + 6xm = 12 - y$
اضافة y للطرفين

$2xy + y + 6xm = 12$
طرح $6xm$ من الطرفين

$2xy + y = 12 - 6xm$
عامل مشترك

$y(2x + 1) = 12 - 6xm$

القسمة على $(2x + 1)$

$\therefore y = \frac{12 - 6xm}{2x + 1} \quad x \neq -\frac{1}{2}$

4. $\sqrt{\frac{a+x}{y}} = a$

ترفع الطرفين
 $\frac{a+x}{y} = a^2$

القسمة على a^2
 $\therefore a^2 y = a + x$

$\therefore y = \frac{a+x}{a^2} \quad a \neq 0$

5. $C = \frac{5}{9}(F - 32)$

الضرب في $\frac{9}{5}$
 $\frac{9}{5}C = F - 32$

اضافة 32 للطرفين
 $F = \frac{9}{5}C + 32$

6. $F = \frac{9}{5}(30) + 32$
 $= 54 + 32 = 86^\circ$

7. $V = IR$

$\therefore V = \frac{q}{t} \cdot R \quad t \neq 0$

8. $V = \frac{qR}{t} \quad \therefore Vt = Rq$

$\therefore q = \frac{Vt}{R} \quad R \neq 0$

$$9. \quad 3y^2 - 9x^2 - r^2 = 0$$

اضافة $9x^2 + r^2$ للطرفين

$$3y^2 = 9x^2 + r^2$$

القسم على 3

$$\therefore y^2 = \frac{9x^2 + r^2}{3}$$

اخذ الجذر التربيعي

$$\therefore y = \pm \sqrt{\frac{9x^2 + r^2}{3}} = \sqrt{3x^2 + \frac{r^2}{3}}$$

$$10. \quad 2xy - 3x - 4 = 5y$$

طرح $5y$ من الطرفين

$$2xy - 5y - 3x - 4 = 0$$

اضافة $3x + 4$

$$2xy - 5y = 3x + 4$$

عامل مشترك

$$y(2x - 5) = 3x + 4$$

القسم على $(2x - 5)$

$$\therefore y = \frac{3x + 4}{2x - 5} \quad x \neq \frac{5}{2}$$

$$11. \quad 3(xy - 2m) = x(2y + 10)$$

$$3xy - 6m = 2xy + 10x$$

طرح $2xy$

$$3xy - 2xy - 6m = 10x$$

اضافة $6m$

$$xy = 10x + 6m$$

القسم على x

$$\therefore y = \frac{10x + 6m}{x} \quad x \neq 0$$

or $y = 10 + \frac{6m}{x}$

$$12. \quad \sqrt{\frac{y-a}{x}} = \frac{\sqrt{y}}{a}$$

تربيع الطرفين

$$\frac{y-a}{x} = \frac{y}{a^2}$$

$$\therefore xy = a^2 y - a^3$$

طرح $a^2 y$

$$xy - a^2 y = -a^3$$

عامل مشترك y

$$y(x - a^2) = -a^3$$

القسم على $(x - a^2)$

$$\therefore y = -\frac{a^3}{x - a^2}$$

$x - a^2 \neq 0$
 $\Rightarrow x \neq a^2$

$$13. \quad F = G \frac{m_1 m_2}{r^2}$$

$$Fr^2 = G m_1 m_2$$

القسم على F

$$r^2 = \frac{G m_1 m_2}{F}$$

اخذ الجذر التربيعي

$$\therefore r = \sqrt{\frac{G m_1 m_2}{F}}$$

$$14. \quad m_1 = 6 \quad m_2 = 5$$

$$F = 2.002 \times 10^{-11}$$

$$G = 6.673 \times 10^{-11}$$

$$\therefore r = \sqrt{\frac{6.673 \times 10^{-11} \times 6 \times 5}{2.002 \times 10^{-11}}}$$

$$r \approx 10 \quad (\text{لا تُخرج عدد دك})$$

$$15. \lambda = \frac{v}{f} \quad \therefore f = \frac{1}{\lambda}$$

$$\therefore f = \frac{1}{T} \therefore Tf = 1 \quad \therefore T = \frac{1}{f} \textcircled{1}$$

$$\therefore \lambda = \frac{v}{f} \therefore f \lambda = v \therefore f = \frac{v}{\lambda} \textcircled{2}$$

بوضع قيمة f في $\textcircled{1}$ نحصل على

$$\therefore T = \frac{1}{\frac{v}{\lambda}} \Rightarrow T = \frac{\lambda}{v}$$

$$16. T = \frac{\lambda}{v} \therefore Tv = \lambda$$

$$\therefore v = \frac{\lambda}{T}$$

$$17. \sqrt{\frac{a+b}{a-b}} = 3 \quad , a$$

$$\frac{a+b}{a-b} = 9$$

$$9(a-b) = a+b \Rightarrow 9a - 9b = a+b$$

بإضافة $9b$ للطرفين

$$9a - a = 9b + b$$

$$8a = 10b \quad \therefore a = \frac{10b}{8} = \frac{5}{4}b$$

$$18. y = \sqrt{\frac{2x^2-5}{3}} \quad , x$$

$$\frac{2x^2-5}{3} = y^2$$

$$2x^2 - 5 = 3y^2$$

$$2x^2 = 3y^2 + 5$$

$$x^2 = \frac{3y^2+5}{2}$$

$$\therefore x = \pm \sqrt{\frac{3y^2+5}{2}}$$

$$19. A = 2xy + \frac{1}{2}\pi x^2$$

$$C = 2x + 2y + \pi x$$

$$2y = C - 2x - \pi x$$

$$\therefore y = \frac{C - 2x - \pi x}{2}$$

النعوض عن y في معادلة المساحة

$$\therefore A = 2x \left(\frac{C - 2x - \pi x}{2} \right) + \frac{1}{2}\pi x^2$$

$$A = Cx - 2x^2 - \pi x^2 + \frac{1}{2}\pi x^2$$

x عامل مشترك

$$A = x(C - 2x - \pi x + \frac{1}{2}\pi x)$$

$$A = x(C - 2x - \frac{1}{2}\pi x)$$

$$20. C = 66 \text{ cm} \quad x = 7 \text{ cm}$$

$$A = 7 \left[66 - 2(7) - \frac{1}{2}(\frac{22}{7})(7) \right]$$

$$A = 7(66 - 14 - 11)$$

$$A = 287 \text{ cm}^2$$

77113376 على رقم خطاب

حلول الدرس الثاني "المتتاليات العددية"

1. $-2, 1, -\frac{1}{2}, -\frac{1}{2}, 1, -2, -2, 1, \dots$

$$a_n = \frac{a_{n-1}}{a_{n-2}}, n \geq 3$$

2. $1, 2, 7, 20, 61, \dots$

$$a_n = 2a_{n-1} + 3a_{n-2}, n \geq 3$$

3. $a_1 = 30, a_n = a_{n-1} - 2n, n \geq 2$

$$\begin{aligned} a_2 &= 30 - 2(2) = 30 - 4 = 26 \\ a_3 &= 26 - 2(3) = 26 - 6 = 20 \\ a_4 &= 20 - 2(4) = 20 - 8 = 12 \\ a_5 &= 12 - 2(5) = 12 - 10 = 2 \end{aligned}$$

∴ الحد الخامس هو 2

4. $a_1 = 2, a_2 = -3, a_n = 3a_{n-1} + 2a_{n-2}$

$$\begin{aligned} a_3 &= 3(-3) + 2(2) = -9 + 4 = -5 \\ a_4 &= 3(-5) + 2(-3) = -15 - 6 = -21 \\ a_5 &= 3(-21) + 2(-5) = -63 - 10 = -71 \end{aligned}$$

∴ الحد الخامس هو -71

$1, 5, 25, 125, 625$

6. $a_1 = 1, a_n = 5a_{n-1}, n \geq 2$

7. $-5, 4, -1, 3, 2, 5, 7, 12, \dots$

$$a_1 = -5, a_2 = 4, a_n = a_{n-1} + a_{n-2}, n \geq 3$$

8. $1, 2, 2, 4, 8, 32, \dots$

$$a_1 = 1, a_2 = 2, a_n = a_{n-1} \times a_{n-2}, n \geq 3$$

9. $a_1 = 4, a_n = 4a_{n-1}, n \geq 2$

$$a_2 = 4(4) = 16$$

$$a_3 = 4(16) = 64$$

$$a_4 = 4(64) = 256$$

$$a_5 = 4(256) = 1024$$

$$a_6 = 4(1024) = 4096$$

∴ الحد السادس هو 4096

10. $a_1 = -0.2, a_2 = 0.3$

$$a_n = a_{n-1} - a_{n-2}, n \geq 3$$

$$a_3 = a_2 - a_1 = 0.3 - (-0.2) = 0.5$$

$$a_4 = a_3 - a_2 = 0.5 - 0.3 = 0.2$$

$$a_5 = a_4 - a_3 = 0.2 - 0.5 = -0.3$$

$$a_6 = a_5 - a_4 = -0.3 - 0.2 = -0.5$$

∴ الحد السادس هو -0.5

11. الضغط عند قاعدة قدم واطم

$$= 14.7 + 0.445 = 15.145$$

$$\therefore a_1 = 15.145$$

$$a_2 = 15.145 + 0.445 = 15.590$$

$$a_3 = 15.590 + 0.445 = 16.035$$

$$\downarrow$$

$$q_0 = 19.15 \text{ psi}$$

12. $a_1 = 15.145$

$$a_n = a_{n-1} + 0.445, n \geq 2$$

13. 40, 80, 60, 70, 65, 67.5, ...

$$a_1 = 40, a_2 = 80$$

$$a_n = \frac{a_{n-1} + a_{n-2}}{2}, n \geq 3$$

14. 4, 5, 2, -6, -16, -20, ...

$$a_1 = 4, a_2 = 5$$

$$a_n = 2a_{n-1} - 2a_{n-2}, n \geq 3$$

15. $a_1 = 45, a_n = a_{n-1} - 4, n > 1$

$$a_2 = 45 - 4 = 41$$

$$a_3 = 41 - 4 = 37$$

$$a_4 = 37 - 4 = 33$$

$$a_5 = 33 - 4 = 29$$

$$a_6 = 29 - 4 = 25$$

∴ الحد الـ 25 هو السادس

19. $a_1 = 2, a_2 = 3$

$$a_n = a_{n-1} a_{n-2} - 2, n \geq 3$$

$$a_3 = a_2 a_1 - 2 = (3)(2) - 2 = 4$$

$$a_4 = (4)(3) - 2 = 10$$

$$a_5 = (10)(4) - 2 = 38$$

20.

$$1200, 200, 1000, -800, 1800, -2600, \dots$$

الإجابة الصحيحة (B)

$$a_1 = 1200, a_2 = 200, a_n = a_{n-1} - a_{n-2}, n \geq 3$$

حلول الدرس الثالث
ثاني عشر تأ سيس

$$1. f(x) = 3x^3, g(x) = x^3 + 2x - 3$$

$$\begin{aligned}(f+g)x &= f(x) + g(x) \\ &= (3x^3) + (x^3 + 2x - 3) \\ &= 4x^3 + 2x - 3\end{aligned}$$

$$\begin{aligned}2. (f-g)x &= f(x) - g(x) \\ &= (3x^3) - (x^3 + 2x - 3) \\ &= 3x^3 - x^3 - 2x + 3 \\ &= 2x^3 - 2x + 3\end{aligned}$$

$$f(x) = x^2 + 3x - 10, g(x) = x - 5$$

$$\begin{aligned}3. (f \cdot g)(x) &= f(x) \cdot g(x) \\ &= (x^2 + 3x - 10)(x - 5) \\ &= x^3 - 5x^2 + 3x^2 - 15x - 10x + 50 \\ &= x^3 - 2x^2 - 25x + 50\end{aligned}$$

$$\begin{aligned}4. \left(\frac{f}{g}\right)(x) &= \frac{f(x)}{g(x)} \\ &= \frac{x^2 + 3x - 10}{x - 5}, x \neq 5\end{aligned}$$

$$f(x) = x^2 + 5, g(x) = 2x^2 - 3x + 1, h(x) = 2x - 1$$

$$\begin{aligned}5. \left(\frac{g+f}{h}\right)(x) &= \frac{g(x) + f(x)}{h(x)} \\ &= \frac{(2x^2 - 3x + 1) + (x^2 + 5)}{2x - 1} \\ &= \frac{3x^2 - 3x + 6}{2x - 1}, x \neq \frac{1}{2}\end{aligned}$$

$$\begin{aligned}6. (g-f \cdot h)(x) &= g(x) - [f(x) \cdot h(x)] \\ &= 2x^2 - 3x + 1 - [(x^2 + 5)(2x - 1)] \\ &= 2x^2 - 3x + 1 - (2x^3 - x^2 + 10x - 5) \\ &= 2x^2 - 3x + 1 - 2x^3 + x^2 - 10x + 5 \\ &= -2x^3 + 3x^2 - 13x + 6\end{aligned}$$

$$\begin{aligned}7. (f-g+2h)(x) &= f(x) - g(x) + 2h(x) \\ &= x^2 + 5 - (2x^2 - 3x + 1) + 2(2x - 1) \\ &= x^2 + 5 - 2x^2 + 3x - 1 + 4x - 2 \\ &= -x^2 + 7x + 2\end{aligned}$$

$$\begin{aligned}8. \left(\frac{f-h}{g}\right)(x) &= \frac{f(x) - h(x)}{g(x)} \\ &= \frac{(x^2 + 5) - (2x - 1)}{2x^2 - 3x + 1} \\ &= \frac{x^2 - 2x + 6}{2x^2 - 3x + 1} = \frac{x^2 - 2x + 6}{(2x - 1)(x - 1)} \\ &x \neq \frac{1}{2} \quad x \neq 1\end{aligned}$$

$$\begin{aligned}9. f(x) &= 2x^2 + 3x - 9 \quad \leftarrow \text{الطول} \\ g(x) &= 2x + 3 \quad \leftarrow \text{العرض}\end{aligned}$$

$$\begin{aligned}\text{طول المساحة الممتلئة} &= 2f(x) + 2g(x) \\ &= 2(2x^2 + 3x - 9) + 2(2x + 3) \\ &= 4x^2 + 6x - 18 + 4x + 6 \\ &= 4x^2 + 10x - 12\end{aligned}$$

10. $\text{طوال السكة! إذا كان}$
 $x = 3 \text{ m}$

$$\begin{aligned} &= 4(3)^2 + 10(3) - 12 \\ &= 4(9) + 30 - 12 \\ &= 36 + 30 - 12 \\ &= 66 - 12 \\ &= 54 \text{ m} \end{aligned}$$

$$f(x) = 2x^2 + 3x - 4 \quad \text{و} \quad g(x) = 3x - 7$$

11. $(f+g)(x) = f(x) + g(x)$

$$\begin{aligned} &= 2x^2 + 3x - 4 + 3x - 7 \\ &= 2x^2 + 6x - 11 \end{aligned}$$

12. $(f-g)(x) = f(x) - g(x)$

$$\begin{aligned} &= 2x^2 + 3x - 4 - (3x - 7) \\ &= 2x^2 + 3x - 4 - 3x + 7 \\ &= 2x^2 + 3 \end{aligned}$$

$$f(x) = x^2 - 12 \quad \text{و} \quad g(x) = x - 3$$

13. $(f \cdot g)(x) = f(x) \cdot g(x)$

$$\begin{aligned} &= (x^2 - 12)(x - 3) \\ &= x^3 - 3x^2 - 12x + 36 \end{aligned}$$

14. $\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$
 $= \frac{x^2 - 12}{x - 3}, \quad x \neq 3$

$$f(x) = x^2 + x + 1 \quad \text{و} \quad g(x) = x^3 - 1$$

$$h(x) = x - 1$$

15. $(g - f \cdot h)(x)$

$$\begin{aligned} &15) (g - f \cdot h)(x) \\ &= g(x) - [f(x) \cdot h(x)] \\ &= x^3 - 1 - [(x^2 + x + 1)(x - 1)] \\ &= x^3 - 1 - (x^3 - x^2 + x^2 - x + x - 1) \\ &= x^3 - 1 - (x^3 - 1) \\ &= x^3 - 1 - x^3 + 1 \\ &= 0 \end{aligned}$$

16. $(g - f + 2h)(x)$

$$\begin{aligned} &= x^3 - 1 - (x^2 + x + 1) + 2(x - 1) \\ &= x^3 - 1 - x^2 - x - 1 + 2x - 2 \\ &= x^3 - x^2 + x - 4 \end{aligned}$$

17. $\left(\frac{g+f}{h}\right)(x)$

$$\begin{aligned} &= \frac{x^3 - 1 + x^2 + x + 1}{x - 1} \\ &= \frac{x^3 + x^2 + x}{x - 1}, \quad x \neq 1 \end{aligned}$$

$$18. \left(\frac{f-g}{h-g} \right) (x)$$

$$= \frac{x^2 + x + 1 - (x^2 - 1)}{x - 1 - (x^3 - 1)}$$

$$= \frac{x^2 + x + 1 - x^2 + 1}{x - 1 - x^3 + 1} = \frac{x^2 - x^3 + x + 2}{x - x^3}$$

لكي يكتب البسط على الصورة القياسية نضع

$$x - x^3 \neq 0$$

$$x(1 - x^2) \neq 0$$

$$x \neq 0 \text{ أو } (1-x)(1+x) \neq 0$$

↓

$$x \neq 1 \text{ و } x \neq -1$$

$$f(x) = 2x^2 + 2x + 3 \quad \leftarrow \text{القاعدة}$$

$$h(x) = x^2 \quad \leftarrow \text{الارتفاع}$$

$$19. \text{ مساحة القاعدة } A = \frac{\text{القاعدة} \times \text{الارتفاع}}{2}$$

$$= \frac{(2x^2 + 2x + 3)(x^2)}{2}$$

$$A = \frac{2x^4 + 2x^3 + 3x^2}{2} = x^4 + x^3 + \frac{3}{2}x^2$$

$$20. \quad x = 2 \text{ m}$$

$$A = \frac{2(2)^4 + 2(2)^3 + 3(2)^2}{2}$$

$$= \frac{2(16) + 2(8) + 3(4)}{2}$$

$$= \frac{32 + 16 + 12}{2} = \frac{60}{2}$$

$$= 30 \text{ cm}^2$$

$$f(-2) = 13, g(-2) = 7$$

$$h(-2) = -2$$

$$21. \quad (f \cdot g + h)(-2)$$

$$= [f(-2) \cdot g(-2)] + h(-2)$$

$$= (13 \times 7) + (-2)$$

$$= 91 - 2 = 89$$

$$22. \left(\frac{f \cdot h - g \cdot h}{3g} \right) (-2)$$

$$= \frac{[f(-2) \cdot h(-2)] - [g(-2) \cdot h(-2)]}{3g(-2)}$$

$$= \frac{(13 \times -2) - (7 \times -2)}{3(7)}$$

$$= \frac{-26 - (-14)}{21} = \frac{-26 + 14}{21} = -\frac{12}{21} = -\frac{4}{7}$$

$$23. f(3) - g(4) + h(-4)$$

$$= 89 - 2 + 2$$

$$= 89$$

$$24. \frac{g(9) - h(9)}{f(1)} = \frac{3 - 3}{1}$$

$$= 0$$

$$25. (h(-1) + g(1)) \cdot f(2)$$

$$= (1 + 1) \cdot 4 = 8$$

$$26. (3f - 2g)(1) \cdot h(-4)$$

$$= [3f(1) - 2g(1)] \cdot h(-4)$$

$$= [3(1) - 2(1)] \cdot 2 = 2$$

حل اختبار منتصف الوحدة الأولى

$$1. 2y + 9 = 3xy$$

$$2y - 3xy = -9$$

$$y(2 - 3x) = -9$$

$$y = \frac{-9(-1)}{2 - 3x(-1)} \Rightarrow y = \frac{9}{3x - 2}$$

$$x \neq \frac{2}{3}$$

(B)

$$2. a_2 = 3(8) - 15 = 9$$

$$a_3 = 3(9) - 15 = 12$$

$$a_4 = 3(12) - 15 = \boxed{21} \text{ (D)}$$

$$3. \star 9 = 7 \text{ (A)}$$

$$a_n = (-2) a_{n-1}, n > 1$$

$$4. (f + g)(x)$$

$$= 2x^2 + 5x + 4 - x^2$$

$$= x^2 + 5x + 4 \text{ (C)}$$

$$5. \left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)}$$

$$= \frac{8 + x^3}{5x - 10} \text{ (B)}$$

$$6. (f \cdot g)(x) = f(x) \cdot g(x)$$

$$= (x + 5)(x - 2)$$

$$= x^2 + 3x - 10 \text{ (D)}$$

$$7. a) d = v_i t + \frac{1}{2} a t^2$$

$$\frac{1}{2} a t^2 = d - v_i t$$

$$a t^2 = 2d - 2v_i t$$

$$a = \frac{2d - 2v_i t}{t^2}$$

$$b) a = \frac{2(150) - 2(5)(10)}{(10)^2}$$

$$a = 2 \text{ m/s}^2$$

$$8. a_1 = -2.5, a_n = 2a_{n-1} + 5$$

$$a_2 = 2(-2.5) + 5 = 0$$

$$a_3 = 2(0) + 5 = 5$$

$$a_4 = 2(5) + 5 = 15$$

$$a_5 = 2(15) + 5 = 35$$

$$a_6 = 2(35) + 5 = 75$$

9. $1, -2, 3, -5, 8, -13, \dots$

$a_1 = 1, a_2 = -2$

$a_n = a_{n-2} - a_{n-1}, n \geq 3$

10. $f(x) = x^2 + 2x, g(x) = x - 7$

$$\begin{aligned}(f+g)(x) &= f(x) + g(x) \\ &= x^2 + 2x + x - 7 \\ &= x^2 + 3x - 7\end{aligned}$$

$$\left(\frac{f}{g}\right)(x) = \frac{f(x)}{g(x)} = \frac{x^2 + 2x}{x - 7} \quad (x \neq 7)$$

11. $f(x) = x^2 + 1, g(x) = 1 - x^2$

$$\begin{aligned}\left(\frac{f-g}{g}\right)(x) &= \frac{f(x) - g(x)}{g(x)} \\ &= \frac{x^2 + 1 - (1 - x^2)}{1 - x^2} = \frac{x^2 + 1 - 1 + x^2}{1 - x^2} \\ &= \frac{2x^2}{1 - x^2}, x \neq 1, x \neq -1\end{aligned}$$

Date:

no:

حل نمايندگی 1-4

الدوال العكسية

تحقق من فصول

1A)

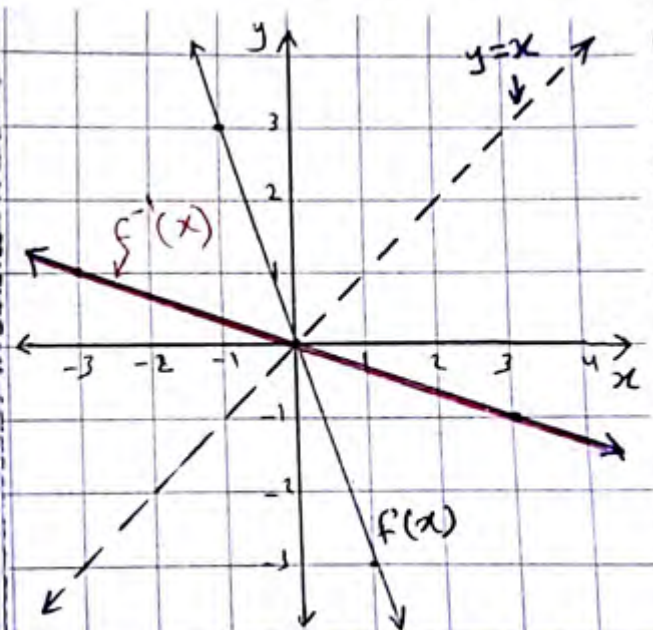
رسم الخط $y=x$

تحديد نقاط على الدالة

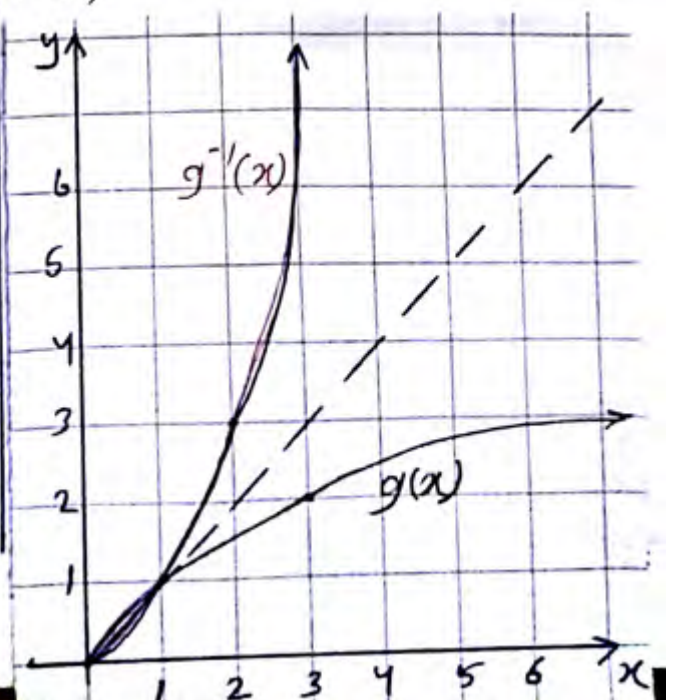
$(0,0), (1,-3), (-1,3)$

صدر، النقاط بالترتيب من فوق $y=x$

$(0,0), (-3,1), (3,-1)$



1B)



تحقق من مضمون

$$2A) f(x) = 3x - 6$$

$$y = 3x - 6$$

$$x = 3y - 6$$

$$x + 6 = 3y$$

$$\frac{x+6}{3} = y$$

$$\therefore f^{-1}(x) = \frac{x+6}{3}$$

$$2B) f(x) = \sqrt{x} - 1 \quad x \geq 0$$

$$y = \sqrt{x} - 1$$

$$x = \sqrt{y} - 1$$

$$x + 1 = \sqrt{y}$$

$$(x+1)^2 = y$$

$$x^2 + 2x + 1 = y \quad \text{أي } y = (x+1)^2$$

$$\therefore f^{-1}(x) = x^2 + 2x + 1$$

$$2C) f(x) = \frac{x-1}{x}, \quad x \neq 0$$

$$y = \frac{x-1}{x} \Rightarrow x = \frac{y-1}{y}$$

$$xy = y - 1 \Rightarrow xy - y = -1$$

$$y(x-1) = -1 \Rightarrow y = \frac{-1}{x-1}$$

$$\therefore f^{-1}(x) = \frac{-1}{x-1}, \quad x \neq 1$$

$$3A) f(x) = 1250x + 100$$

$$y = 1250x + 100$$

$$x = \frac{y-100}{1250}$$

$$x - 100 = 1250y$$

$$y = \frac{x-100}{1250}$$

$$\therefore f^{-1}(x) = \frac{x-100}{1250}$$

حيث x تمثل قيمة الخزانة

و $f^{-1}(x)$ تمثل عدد التذاكر

$$3B) f^{-1}(5100) = \frac{5100 - 100}{1250} = \frac{5000}{1250} = 4 \text{ تذكرة}$$

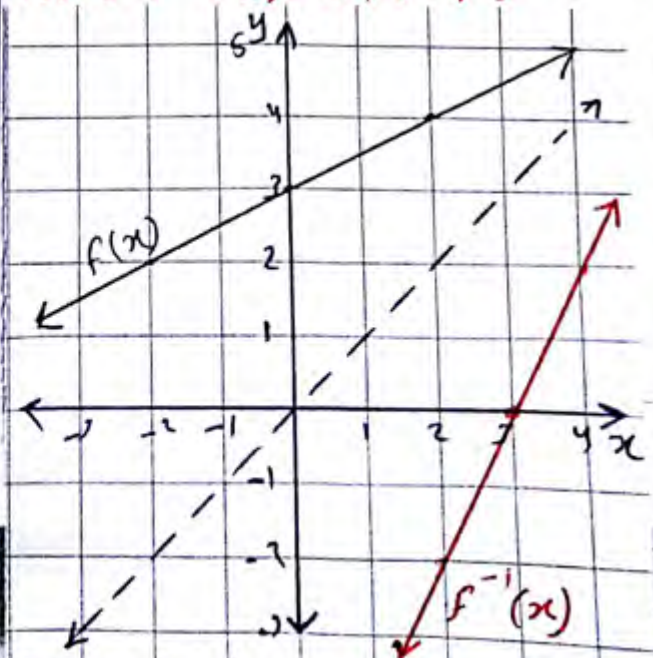
حل تمارين تأكد

1)

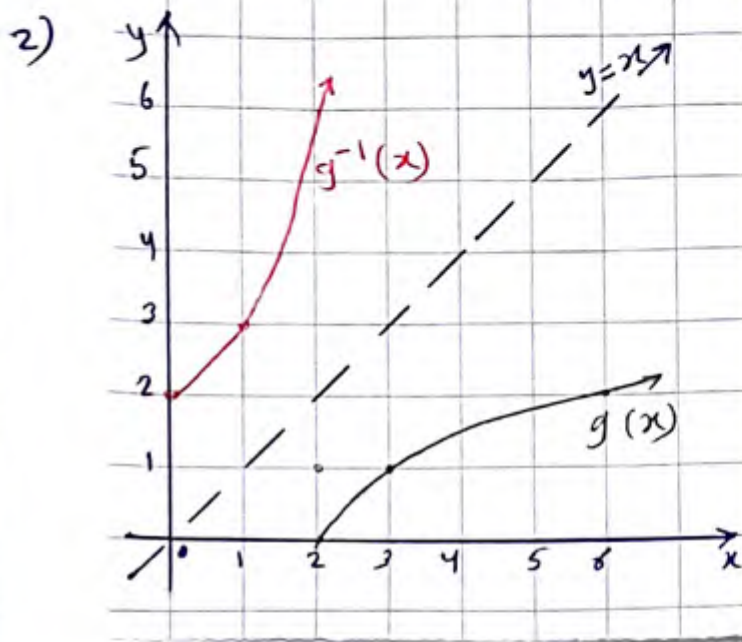
نجد بعض النقاط على المستقيم
الممثل للدالة $f(x)$ ، ثم نجد
صور هذه النقاط باستخدام
صورة المستقيم $y = x$

$$(0, 3), (-2, 2), (2, 4)$$

$$(3, 0), (2, -2), (4, 2)$$



تمرینات کد درس ۱-۶



3) $f(x) = x - 6$

$$y = x - 6 \Rightarrow x = y + 6$$

$$y = x + 6 \Rightarrow f^{-1}(x) = x + 6$$

4) $f(x) = 1 - \sqrt{x}, x \geq 0$

$$y = 1 - \sqrt{x} \Rightarrow x = 1 - \sqrt{y}$$

$$\sqrt{y} = 1 - x \Rightarrow y = (1 - x)^2$$

$$\therefore f^{-1}(x) = (1 - x)^2$$

5) $f(x) = \frac{5-x}{x}, x \neq 0$

$$y = \frac{5-x}{x} \Rightarrow x = \frac{5-y}{y}$$

$$xy = 5 - y$$

$$xy + y = 5 \Rightarrow y(x+1) = 5$$

$$y = \frac{5}{x+1}$$

$$\therefore f^{-1}(x) = \frac{5}{x+1}, x \neq -1$$

$f(x) = 15x + 50, x \geq 1$

6) $y = 15x + 50 \Rightarrow x = \frac{y-50}{15}$

$$15y = x - 50$$

$$\therefore y = \frac{x-50}{15}$$

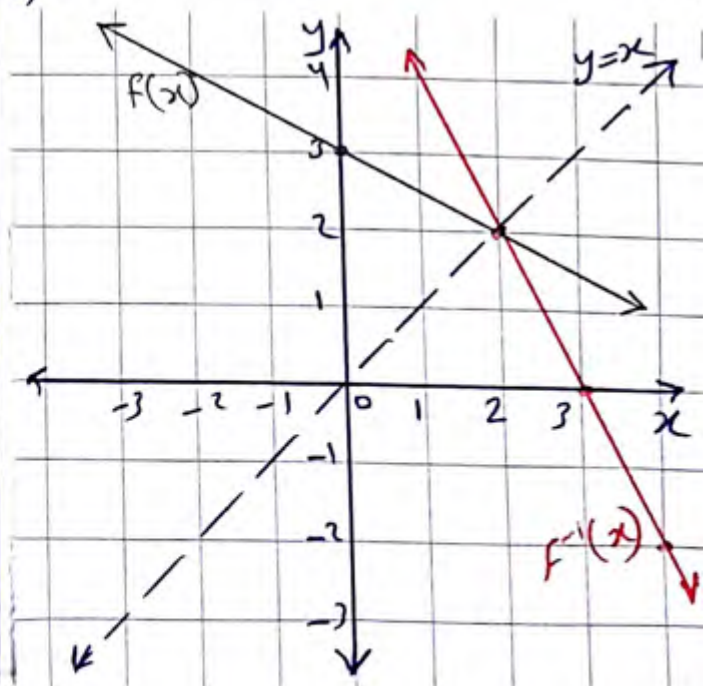
$$f^{-1}(x) = \frac{x-50}{15}$$

صورت و مخرج را تقاضیات حاصل
و $f^{-1}(x)$ مخرج را از صورت خارج

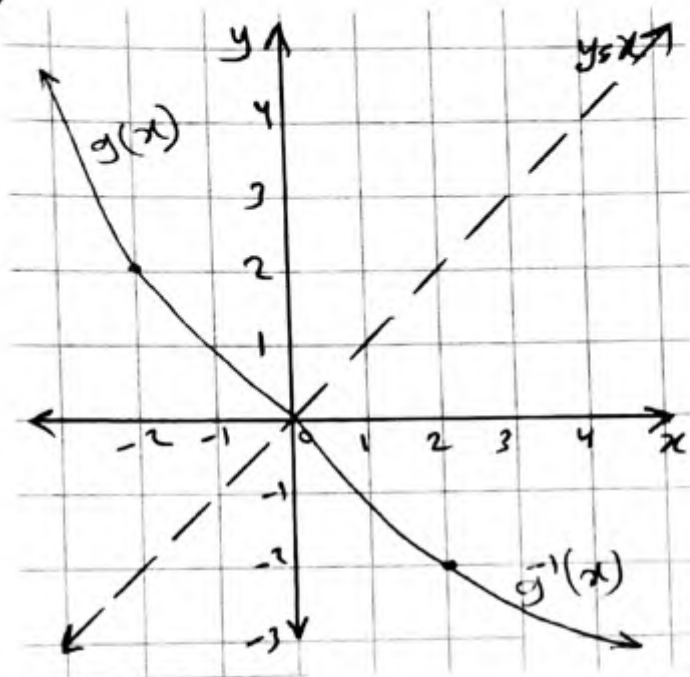
7) $f^{-1}(1550) = \frac{1550 - 50}{15}$

$$= \frac{1500}{15} = 100 \text{ m}^2$$

8)



1)



$$2xy - 3x = y$$

$$2xy - y = 3x \Rightarrow y(2x-1) = 3x$$

$$y = \frac{3x}{2x-1}$$

$$\therefore f^{-1}(x) = \frac{3x}{2x-1}, x \neq \frac{1}{2}$$

$$f(x) = 7x$$

$$13) y = 7x \Rightarrow x = \frac{y}{7}$$

$$y = \frac{x}{7} \therefore f^{-1}(x) = \frac{x}{7}$$

x تمثل عدد الدالة
 $f^{-1}(x)$ تمثل عدد دالة العمل

$$14) f^{-1}(56) = \frac{56}{7} = 8 \text{ لـ } 8$$

$$1) f(x) = 5 + \sqrt{x}, x \geq 0$$

$$y = 5 + \sqrt{x} \Rightarrow x = 5 + \sqrt{y}$$

$$\sqrt{y} = x - 5 \Rightarrow y = (x-5)^2$$

$$\therefore f^{-1}(x) = (x-5)^2$$

$$2) f(x) = \frac{x}{2x-3}, x \neq \frac{3}{2}$$

$$y = \frac{x}{2x-3} \Rightarrow x = \frac{y}{2y-3}$$

$$x(2y-3) = y$$

$$15) f(x) = x^3 + 2$$

$$y = x^3 + 2 \Rightarrow x = \sqrt[3]{y-2}$$

$$y^3 = x - 2$$

$$y = \sqrt[3]{x-2}$$

$$\therefore f^{-1}(x) = \sqrt[3]{x-2}$$

$$16) g(x) = 2 - x^2, x \leq 0$$

$$y = 2 - x^2$$

$$x = 2 - y^2$$

$$y^2 = 2 - x$$

$$y = \sqrt{2-x}$$

$$\therefore g^{-1}(x) = \sqrt{2-x}, x \leq 2$$

تمارين درس 1-4

7)

$$k(x) = \sqrt[3]{x-1}$$

$$y = \sqrt[3]{x-1} \Rightarrow x = \sqrt[3]{y-1}$$

$$x^3 = y-1 \Rightarrow y = x^3+1$$

$$\therefore k^{-1}(x) = x^3+1$$

$$18) h(x) = 2 - \frac{1}{x-1}, x \neq 1$$

$$y = 2 - \frac{1}{x-1} \Rightarrow x = 2 - \frac{1}{y-1}$$

$$\frac{1}{y-1} = 2-x$$

$$(y-1)(2-x) = 1$$

$$2y - xy - 2 + x = 1$$

$$2y - xy = 3 - x$$

$$y(2-x) = 3-x$$

$$y = \frac{3-x}{2-x} \stackrel{(-1)}{\stackrel{(-1)}}{=} \frac{x-3}{x-2}$$

$$\therefore h^{-1}(x) = \frac{x-3}{x-2}, x \neq 2$$

$$f(1) = 5 \rightarrow (1, 5)$$

$$19) \therefore g(5) = 1 \quad \downarrow (5, 1)$$

$$f(3) = 7 \rightarrow (3, 7)$$

$$20) g(7) = 3 \quad \downarrow (7, 3)$$

$$g(2) = -2 \rightarrow (2, -2)$$

$$21) f(-2) = 2 \quad \downarrow (-2, 2)$$

تمارين درس 1-5 التفكير العليا

$$22) f(x) = \sqrt{x-a}, f^{-1}(16) = 4$$

$$y = \sqrt{x-a} \Rightarrow x = y^2 + a$$

$$x = y^2 + a \Rightarrow y = \sqrt{x-a}$$

$$\therefore f^{-1}(x) = x^2 + a$$

$$\therefore f^{-1}(16) = 4$$

$$\therefore 4 = x^2 + a \Rightarrow 4 = 16^2 + a$$

$$\therefore a = 4 - 16^2 \Rightarrow a = -252$$

24)

إجابة خالدة هي الصحيحة

لا نأخذ الجواب الذي هو العكس، إنما
نأخذ الجواب الذي هو العكس.

$$26) f(x) = 5x+10$$

$$y = 5x+10 \Rightarrow x = \frac{y-10}{5}$$

$$5y = x-10 \Rightarrow y = \frac{x-10}{5}$$

$$\therefore f^{-1}(x) = \frac{x-10}{5} \quad \text{الإجابة هي (B)}$$

$$27) f(x) = \sqrt{x+5} \Rightarrow y = \sqrt{x+5}$$

$$x = y^2 + 5 \Rightarrow x^2 = y + 5$$

$$y = x^2 - 5$$

$$\therefore f^{-1}(x) = x^2 - 5 \quad \text{الإجابة هي (C)}$$

درس 5-1 "تركيب الدوال"

تحقق من فروض

1A)

$$f(x) = 5x + 1, g(x) = x - 3$$

$$(f \circ g)(x) = f(x - 3)$$

$$= 5(x - 3) + 1 = 5x - 15 + 1$$

$$= 5x - 14$$

$$(g \circ f)(x) = g(5x + 1)$$

$$= (5x + 1) - 3 = 5x + 1 - 3$$

$$= 5x - 2$$

1B) $f(x) = x - 2, g(x) = x^2 + 5$

$$(f \circ g)(x) = f(x^2 + 5)$$

$$= (x^2 + 5) - 2 = x^2 + 3$$

$$(g \circ f)(x) = g(x - 2)$$

$$= (x - 2)^2 + 5$$

$$= x^2 - 4x + 4 + 5$$

$$= x^2 - 4x + 9$$

2A) $f(x) = x^2 + 5, g(x) = 1 - x$

$$(f \circ g)(-1) = f(g(-1))$$

ن عوض عن $x = -1$ في الدالة g

$$g(-1) = 1 - (-1) = 1 + 1 = 2$$

$$\therefore f(g(-1)) = f(2) = 2^2 + 5 = 9$$

2B) $(g \circ f)(1) = g(f(1))$

$$f(1) = 1^2 + 5 = 6$$

$$g(f(1)) = g(6) = 1 - 6 = -5$$

3A) $h(x) = (3x - 5)^2$

نفترض أن الدالة $f(x) = x^2$
و أن الدالة $g(x) = 3x - 5$

$$h(x) = (3x - 5)^2 = (g(x))^2$$

$$= f(g(x)) = (f \circ g)(x)$$

3B) $h(x) = \sqrt{4 - x}, x \leq 4$

نفترض أن الدالة $f(x) = \sqrt{x}$
و أن الدالة $g(x) = 4 - x$

$$h(x) = \sqrt{4 - x} = \sqrt{g(x)}$$

$$= f(g(x)) = (f \circ g)(x)$$

4A) $f(x) = 3x + 1, g(x) = \frac{1}{3}x - 1$

$$(f \circ g)(x) = f(g(x)) = f\left(\frac{1}{3}x - 1\right)$$

$$= 3\left(\frac{1}{3}x - 1\right) + 1 = x - 3 + 1 = x - 2$$

$$(f \circ g)(x) \neq x$$

إذاً الدالتان f و g غير متعاكستان

4B) $f(x) = \sqrt{x} + 1, g(x) = (x - 1)^2$

$$(f \circ g)(x) = f(x - 1)^2 = \sqrt{(x - 1)^2} + 1$$

$$= x - 1 + 1 = x$$

$$(g \circ f)(x) = g(\sqrt{x} + 1)$$

$$= [(\sqrt{x} + 1) - 1]^2 = (\sqrt{x})^2 = x$$

$$\therefore (f \circ g)(x) = (g \circ f)(x) = x$$

إذاً الدالتان f و g متعاكستان

حل تمارين تأكد د، ص 5-1

$$1) f(x) = 3 - x, g(x) = 2x - 1$$

$$(f \circ g)(x) = f(2x - 1) = 3 - (2x - 1) \\ = 3 - 2x + 1 = 4 - 2x$$

$$(g \circ f)(x) = g(3 - x) = 2(3 - x) - 1 \\ = 6 - 2x - 1 = 5 - 2x$$

$$2) f(x) = 2x^2, g(x) = x - 1$$

$$(f \circ g)(x) = f(x - 1) = 2(x - 1)^2 \\ = 2(x^2 - 2x + 1) = 2x^2 - 4x + 2$$

$$(g \circ f)(x) = g(2x^2) = 2x^2 - 1$$

$$3) f(x) = x^2, x \geq 0, g(x) = \sqrt{x}$$

$$(f \circ g)(x) = f(\sqrt{x}) = (\sqrt{x})^2 = x$$

$$(g \circ f)(x) = g(x^2) = \sqrt{x^2} = x$$

$$f(x) = 5 - x^2, g(x) = 2x + 7$$

$$4) (f \circ g)(-2) = f(g(-2))$$

$$g(-2) = 2(-2) + 7 = 3$$

$$f(3) = 5 - (3)^2 = 5 - 9 = -4$$

$$5) (g \circ f)(0) = g(f(0))$$

$$f(0) = 5 - 0^2 = 5$$

$$g(5) = 2(5) + 7 = 17$$

$$6) (g \circ g^{-1})(8)$$

أولاً نجد الدالة العكسية لـ g

$$g(x) = 2x + 7$$

$$y = 2x + 7 \Rightarrow x = \frac{y - 7}{2}$$

$$2y = x - 7 \Rightarrow y = \frac{x - 7}{2}$$

$$\therefore g^{-1}(x) = \frac{x - 7}{2}$$

$$g^{-1}(8) = \frac{8 - 7}{2} = \frac{1}{2}$$

$$g(g^{-1}(8)) = g\left(\frac{1}{2}\right)$$

$$= 2\left(\frac{1}{2}\right) + 7 = 8$$

$$7) h(x) = \sqrt{6x - 5}$$

$$f(x) = \sqrt{x} \text{ نجعل}$$

$$g(x) = 6x - 5$$

$$h(x) = \sqrt{6x - 5}$$

$$= \sqrt{g(x)} = f(g(x))$$

$$= (f \circ g)(x)$$

$$8) h(x) = 5(x - 3)^2$$

$$f(x) = 5x^2$$

$$g(x) = x - 3$$

نجعل

$$h(x) = 5(x - 3)^2 = 5(g(x))^2$$

$$= f(g(x)) = (f \circ g)(x)$$

Mr. Alaa Khattab

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$$9) f(x) = 5x - 3, g(x) = \frac{x+3}{5}$$

$$(f \circ g)(x) = f\left(\frac{x+3}{5}\right) = 5\left(\frac{x+3}{5}\right) - 3$$

$$= x + 3 - 3 = x$$

$$(g \circ f)(x) = g(5x - 3)$$

$$= \frac{(5x-3)+3}{5} = \frac{5x-3+3}{5}$$

$$= \frac{5x}{5} = x$$

بما أن $(f \circ g)(x) = (g \circ f)(x) = x$ ،
اذن الدالتان f, g متعاكستان

$$10) f(x) = \sqrt{3-x}, g(x) = 3-9x^2$$

$$(f \circ g)(x) = f(3-9x^2) = \sqrt{3-(3-9x^2)}$$

$$= \sqrt{3-3+9x^2} = \sqrt{9x^2} = 3x$$

بما أن $(f \circ g)(x) \neq x$ ،
اذن الدالتان f, g غير متعاكستان

تدرب وحل المسائل

$$11) f(x) = x - 11, g(x) = 11 - x$$

$$(f \circ g)(x) = f(11-x) = (11-x) - 11$$

$$= 11 - x - 11 = -x$$

$$(g \circ f)(x) = g(x-11) = 11 - (x-11)$$

$$= 11 - x + 11 = -x + 22$$

$$12) f(x) = \frac{1}{x^2}, g(x) = \frac{\sqrt{x}}{2}$$

$$(f \circ g)(x) = f\left(\frac{\sqrt{x}}{2}\right) = \frac{1}{\left(\frac{\sqrt{x}}{2}\right)^2}$$

$$= \frac{1}{\frac{x}{4}} = \frac{4}{x}$$

$$(g \circ f)(x) = g\left(\frac{1}{x^2}\right) = \frac{\sqrt{\frac{1}{x^2}}}{2}$$

$$= \frac{\frac{1}{x}}{2} = \frac{1}{2x}$$

$$13) f(x) = 3x + 2, g(x) = x^2 - 2$$

$$(f \circ g)(x) = f(x^2 - 2) = 3(x^2 - 2) + 2$$

$$= 3x^2 - 6 + 2 = 3x^2 - 4$$

$$(g \circ f)(x) = g(3x + 2)$$

$$= (3x + 2)^2 - 2$$

$$= 9x^2 + 12x + 4 - 2$$

$$= 9x^2 + 12x + 2$$

$$14) f(x) = \frac{1}{x}, g(x) = x - 1$$

$$(f \circ g)(x) = f(x - 1)$$

$$= \frac{1}{x-1}, x \neq 1$$

$$(g \circ f)(x) = g\left(\frac{1}{x}\right)$$

$$= \frac{1}{x} - 1, x \neq 0$$

$$f(x) = x^2 - 3x, g(x) = 4x - 3$$

$$\begin{aligned} 15) (f \circ g)(2) &= f(4(2) - 3) \\ &= f(5) = 5^2 - 3(5) = \\ &25 - 15 = 10 \end{aligned}$$

$$\begin{aligned} 16) (g \circ f)(2) &= g(2^2 - 3(2)) \\ &= g(4 - 6) = g(-2) \\ &= 4(-2) - 3 = -11 \end{aligned}$$

$$\begin{aligned} 17) (f \circ g)(0) &= f(4(0) - 3) = f(-3) \\ &= (-3)^2 - 3(-3) = 9 + 9 = 18 \end{aligned}$$

$$\begin{aligned} 18) (f \circ f^{-1})(50) \\ f(x) = x^2 - 3x \Rightarrow y = x^2 - 3x \\ x = y^2 - 3y \\ \text{المطلوب جعل } y \text{ فقط في طرف واحد} \\ \text{نقوم بإكمال المربع بحيث نضيف} \\ \frac{9}{4} \text{ للطرفين} \\ \left(-\frac{3}{4} \right) \text{ هو مربع نصف معامل } y \text{ هو } -3 \end{aligned}$$

$$x + \frac{9}{4} = y^2 - 3y + \frac{9}{4}$$

$$x + \frac{9}{4} = \left(y - \frac{3}{2} \right)^2$$

نأخذ الجذر التربيعي للطرفين

$$\sqrt{x + \frac{9}{4}} = y - \frac{3}{2}$$

$$y = \sqrt{x + \frac{9}{4}} + \frac{3}{2}$$

إذن الدالة العكسية

$$f^{-1}(x) = \sqrt{x + \frac{9}{4}} + \frac{3}{2}$$

$$f^{-1}(50) = \sqrt{50 + \frac{9}{4}} + \frac{3}{2}$$

$$= \frac{3 + \sqrt{209}}{2}$$

$$\therefore f\left(\frac{3 + \sqrt{209}}{2}\right) =$$

$$\begin{aligned} &\left(\frac{3 + \sqrt{209}}{2}\right)^2 - 3\left(\frac{3 + \sqrt{209}}{2}\right) \\ &= \frac{(3 + \sqrt{209})^2}{2^2} - \frac{9 - 3\sqrt{209}}{2} \end{aligned}$$

$$= 50 \quad \leftarrow \text{دالة اى صا}$$

$$= \frac{9 + 6\sqrt{209} + 209}{4} - \frac{9 + 3\sqrt{209}}{2}$$

$$\text{نضرب البسط الثاني في } \frac{2}{2}$$

$$= \frac{9 + 6\sqrt{209} + 209}{4} - \frac{18 + 6\sqrt{209}}{4}$$

$$= \frac{9 + 6\sqrt{209} + 209 - 18 - 6\sqrt{209}}{4}$$

$$= \frac{200}{4} = 50 \quad \checkmark$$

$$19) (g \circ g^{-1})(100)$$

$$g(x) = 4x - 3 \Rightarrow y = 4x - 3$$

$$x = \frac{y + 3}{4} \Rightarrow 4y = x + 3$$

$$y = \frac{x + 3}{4} \therefore g^{-1}(x) = \frac{x + 3}{4}$$

$$g^{-1}(100) = \frac{100 + 3}{4} = \frac{103}{4}$$

$$g\left(\frac{103}{4}\right) = 4\left(\frac{103}{4}\right) - 3$$

$$= 103 - 3 = 100$$

$$20) h(x) = \sqrt[3]{3x+8}$$

$$f(x) = \sqrt[3]{x}, g(x) = 3x+8$$

$$h(x) = \sqrt[3]{3x+8} = \sqrt[3]{g(x)}$$

$$= f(g(x)) = (f \circ g)(x)$$

$$21) h(x) = -4(2x-3)^2$$

$$f(x) = -4x^2, g(x) = 2x-3$$

$$h(x) = -4(2x-3)^2 = -4(g(x))^2$$

$$= f(g(x)) = (f \circ g)(x)$$

$$22) f(x) = 3x-2, g(x) = 2x+3$$

$$(f \circ g)(x) = f(2x+3) = 3(2x+3)-2$$

$$= 6x+9-2 = 6x+7$$

بما أن $f(g(x)) \neq x$
إذ الدالتان غير متعاكستان

$$23) f(x) = \frac{(x-1)^2}{4}, g(x) = 1+2\sqrt{x}$$

$$(f \circ g)(x) = f(1+2\sqrt{x})$$

$$= \frac{(1+2\sqrt{x}-1)^2}{4} = \frac{4x}{4} = x$$

$$(g \circ f)(x) = g\left(\frac{(x-1)^2}{4}\right)$$

$$= 1 + 2\sqrt{\frac{(x-1)^2}{4}} = 1 + 2\left(\frac{x-1}{2}\right)$$

$$= 1 + x - 1 = x$$

إذ الدالتان متعاكستان

$$24) f(x) = x+2, g(x) = 3x$$

$$(f \circ g)(x) = f(3x) = 3x+2$$

$$3x+2 = 8$$

$$3x = 6 \quad \therefore x = 2$$

$$25) g(x) = 3x+1$$

$$g(f \circ g)(x) = \frac{8}{3x-5}$$

$$\frac{8}{3x-5} = \frac{8}{(3x+1)-6}$$

$$= \frac{8}{g(x)-6}$$

$$\therefore f(x) = \frac{8}{x-6}, x \neq 6$$

$$26) g(x) = \sqrt{x+3}, (g \circ f)(x) = \sqrt{x+5}+3$$

$$g[f(x)] = \sqrt{x+5} + 3$$

$$f(x) + 3 = \sqrt{x+5} + 3$$

$$\therefore f(x) = \sqrt{x+5}$$

27) سلم لم يربع العدد 5 قبل
ضربه في 2

28) نأخذ عوضاً بالدالة $f(x)$
بدلاً من الدالة $g(x)$

29) $f(x) = x^2 - 1$
 $g(x) = \sqrt{x+1}$
 $(f \circ g)(x) = f(\sqrt{x+1}) = (\sqrt{x+1})^2 - 1$
 $= x+1-1 = x$
 $(g \circ f)(x) = g(x^2-1) = \sqrt{x^2-1+1} = \sqrt{x^2} = x$

إذاً الدالتان f, x هما
 $f(x) = x^2 - 1$, $g(x) = \sqrt{x+1}$

31) $f(x) = 9x+12$, $g(x) = 2x-3$
 $g(1) = 2(1)-3 = -1$
 $(f \circ g)(1) = f(-1) = 9(-1)+12$
 $= -9+12 = 3$ رقم

32) $f(x) = \sqrt{x-1}$, $g(x) = x^2+1$
 $(f \circ g)(x) = f(x^2+1)$
 $= \sqrt{x^2+1-1} = \sqrt{x^2} = x$
 رقم B

حل تمارين المراجعة الترمية:

33) $(x-y)^2 - 9$
 الجذر التربيعي للطرفين
 $x-y = \pm\sqrt{9}$
 $x-y = \pm 3$
 $y = x \pm 3$

34) -18, -13, -8, -3, ...
 $a_1 = -18$
 $a_n = a_{n-1} + 5$, $n > 1$

35) $f(x) = x^2 - 4$, $g(x) = x - 3$

$(f \cdot g)(x) = f(x) \cdot g(x)$
 $= (x^2 - 4)(x - 3)$
 $= x^3 - 3x^2 - 4x + 12$

36) $f(x) = 2x+3$, $g(x) = \frac{1}{2}x-3$

$f(g(x)) = f(\frac{1}{2}x-3) = 2(\frac{1}{2}x-3)+3$
 $= x-6+3 = x-3$

بما أن $(f \circ g)(x)$ تساوي x
 إذاً الدالتان غير متعاكستان

حل اختبار الوحدة الأول

1) $y^3 - 3xy^3 = 5x$
 نأخذ y^3 عاملاً مشتركاً
 $y^3(1-3x) = 5x$
 نقسم على $(1-3x)$
 $y^3 = \frac{5x}{1-3x}$
 نأخذ الجذر التكعيبي
 $y = \sqrt[3]{\frac{5x}{1-3x}}$
 رقم B

2) $f(x) = 5x^2$, $g(x) = 1-x^3$
 $(f \cdot g)(x) = (5x^2)(1-x^3)$
 $= 5x^2 - 5x^5$
 رقم A

$$3) f(x) = \frac{3}{2x-7} \Rightarrow y = \frac{3}{2x-7}$$

$$x = \frac{3}{2y-7} \Rightarrow 2xy - 7x = 3$$

$$2xy = 7x + 3 \Rightarrow y = \frac{7x+3}{2x}$$

A $\bar{2}$

$$4) a_1 = 5, a_2 = 7, a_n = 2a_{n-1} - 3a_{n-2}$$

$$a_3 = 2(a_2) - 3(a_1) = 2(7) - 3(5) = -1$$

$$a_4 = 2(-1) - 3(7) = -2 - 21 = -23$$

$$a_5 = 2(-23) - 3(-1) = -46 + 3 = -43$$

A $\bar{2}$

$$5) f(x) = 3x^2 - 9, g(x) = 2x + 5$$

$$g(-2) = 2(-2) + 5 = 1$$

$$f(1) = 3(1)^2 - 9 = 3 - 9 = -6$$

C $\bar{2}$

$$6) a) \frac{x^2}{64} + \frac{y^2}{100} = 1$$

$$\frac{x^2}{64} = 1 - \frac{y^2}{100} \Rightarrow \frac{x^2}{64} = \frac{100 - y^2}{100}$$

$$100x^2 = 6400 - 64y^2$$

$$x^2 = \frac{6400 - 64y^2}{100} = \frac{6400}{100} - \frac{64y^2}{100}$$

$$x^2 = 64 - \frac{16}{25}y^2$$

$$\therefore x = \pm \sqrt{64 - \frac{16}{25}y^2}$$

$$b) x = \pm \sqrt{64 - \frac{16}{25}(1)^2}$$

$$= \pm \frac{12\sqrt{11}}{5}$$

$$f(x) = 5 - 2x, g(x) = 4x + 3$$

$$7) (f+g)(x) = f(x) + g(x)$$

$$= 5 - 2x + 4x + 3 = 2x + 8$$

$$8) (f-g)(x) = f(x) - g(x)$$

$$= 5 - 2x - (4x + 3)$$

$$= 5 - 2x - 4x - 3$$

$$= 2 - 6x$$

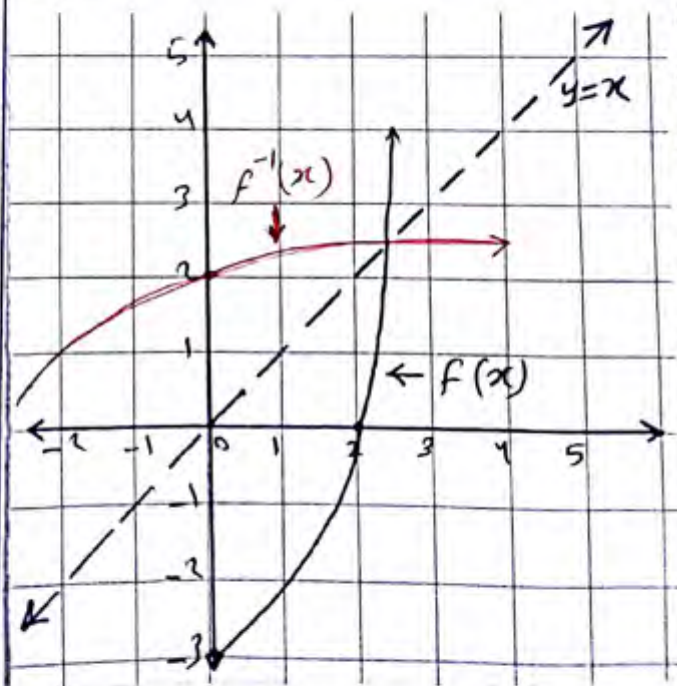
$$9) (f \cdot g)(x) = (5 - 2x)(4x + 3)$$

$$= 20x + 15 - 8x^2 - 6x$$

$$= -8x^2 + 14x + 15$$

$$10) \left(\frac{f}{g}\right)(x) = \frac{5-2x}{4x+3}, x \neq -\frac{3}{4}$$

11)



$$12) -1, 2, 3, 1, -2, -3, \dots$$

$$a_1 = -1, a_2 = 2$$

$$a_n = a_{n-1} - a_{n-2}, n \geq 3$$

$$13) f(x) = 3x + 5, g(x) = \frac{x}{3}$$

$$\begin{aligned} (f \circ g)(x) &= f(g(x)) = f\left(\frac{x}{3}\right) \\ &= 3\left(\frac{x}{3}\right) + 5 = x + 5 \end{aligned}$$

$$14) f(x) = 8 - 5x$$

$$g(x) = \frac{8-x}{5}$$

$$\begin{aligned} (f \circ g)(x) &= f\left(\frac{8-x}{5}\right) \\ &= 8 - 5\left(\frac{8-x}{5}\right) \end{aligned}$$

$$= 8 - 8 + x = x$$

$$(g \circ f)(x) = g(8 - 5x)$$

$$= \frac{8 - (8 - 5x)}{5}$$

$$= \frac{8 - 8 + 5x}{5} = \frac{5x}{5} = x$$

$$(f \circ g)(x) = (g \circ f)(x) = x \text{ کا اُن}$$

سازوۃ التماثل متعاكس