A Level Basics Test: Sample Paper 3

No calculators allowed; please answer on file paper.
Pass mark 75%, or 63 marks out of 84.
Each part of a question is worth 2 marks, except for those in Q4, 13 & 18 which are worth 3 marks.

1: Work out the following:

a) $7 \div (-1) - (-54) \div 6$

b) $(-10) + (-6) \div 2$

2: Work out the following, showing your method and simplifying your answer:

a) $4\frac{2}{5} + 1\frac{4}{9}$

b) $3\frac{1}{2} - 2\frac{4}{7}$

3: Work out the following, showing your method and simplifying your answer:

a) $4\frac{1}{2} \div 1\frac{1}{9}$

b) $1\frac{1}{2} \times 1\frac{1}{3}$

4: Simplify the following:

a) $\dfrac{30e^7g^{11}}{6e^5g^2}$

b) $(2p^6f^5)^3$

c) $4h^{10}b^4 \times 5h^6b^7$

5: Work out the following:

a) 6^0

b) 1^{-2}

6: Work out the following:

a) $8^{1/3}$

b) $64^{-1/2}$

7: Simplify the following surds:

a) $\sqrt{175} + \sqrt{7}$

b) $\sqrt{150} - \sqrt{96}$

8: Simplify the following surds:

$\dfrac{9}{\sqrt{10}}$

9: Simplify the following surds:

$(6 - \sqrt{5})^2$

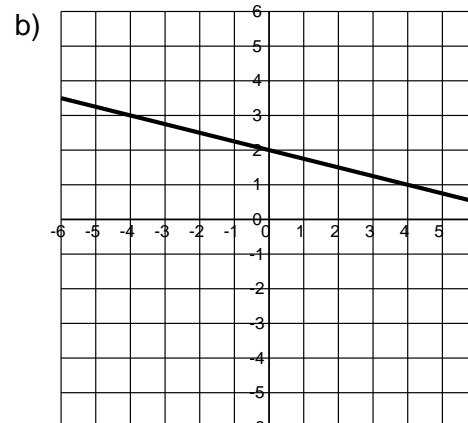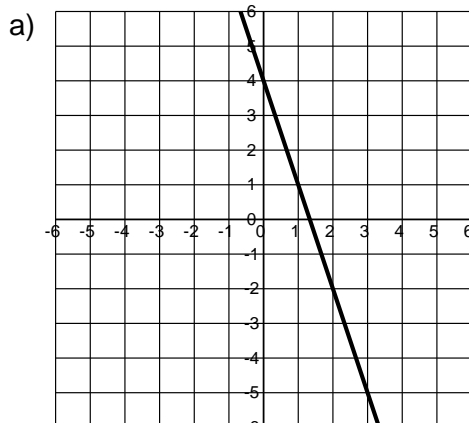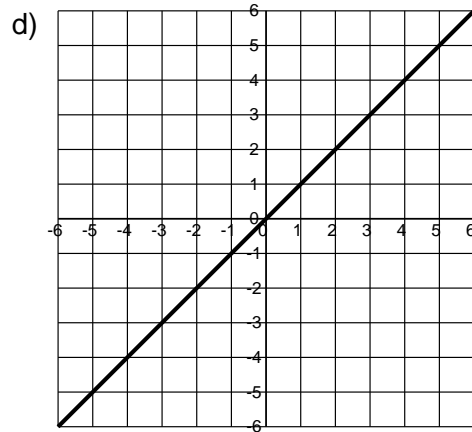**10:** Solve the following:
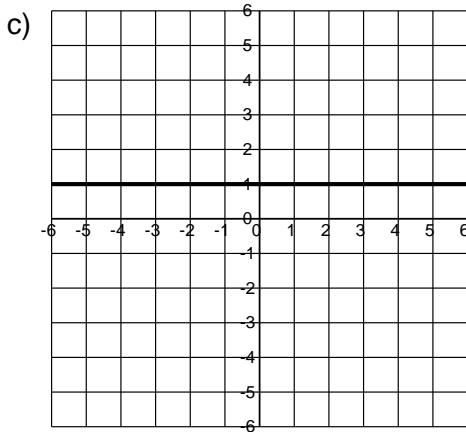
a) $-3x + 8 < 29$

b) $-7(x - 2) \geq 84$

11: Solve the following inequalities:

a) $2x^2 + 19 \leq 21$

b) $3x^2 - 20 \geq 28$

12: Give an equation for the graph:

a)

b)

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c)

d)

13: Work out the following:

  a) A line segment is drawn between (8, 8) and (9, 5). Find its gradient, mid-point and length.

  b) A line segment is drawn between (4, 10) and (7, 6). Find its gradient, mid-point and length.

14: Multiply out and simplify the following:

  $(2t - 9)(4t - 1)$

15: Solve by factorising:

  a) $j^2 + 20j + 100 = 0$

  b) $n^2 - 81 = 0$

16: Factorise the following:

  $2y^2 - 15y - 8$

17: Solve using the quadratic formula, giving your answer in simplified surd form:

  $q^2 + 7q - 3 = 0$

18: Solve the following simultaneous equations:

  $k = v^2 + 5v + 10$
  $k = -v + 5$

19: Simplify the following as far as possible:

  a) $\dfrac{a^2 + a}{a^2 + 2a}$

  b) $\dfrac{12r^2 - 48r}{30r}$

20: Simplify the following as far as possible:

  a) $\dfrac{m - 1}{9} + \dfrac{m + 3}{3}$

  b) $\dfrac{7(w + 4)}{10} - \dfrac{3(w - 2)}{5}$

21: Simplify the following as far as possible:

  a) $\dfrac{7}{8z} \times \dfrac{2z}{5}$

  b) $\dfrac{3c}{10} \div \dfrac{9c}{8}$

Answers: A Level Basics Test: Sample Paper 3

1:     a) $(-7) - (-9) = 2$ b) $(-10) + (-3) = -13$

2:     a) $4\frac{18}{45} + 1\frac{20}{45} = 5\frac{38}{45}$ b) $3\frac{7}{14} - 2\frac{8}{14} = \frac{13}{14}$

3:     a) $\frac{9}{2} \div \frac{10}{9} = \frac{9}{2} \times \frac{9}{10} = \frac{81}{20} = 4\frac{1}{20}$ b) $\frac{3}{2} \times \frac{4}{3} = \frac{1}{1} \times \frac{2}{1} = \frac{2}{1} = 2$

4:     a) $5e^2g^9$ b) $8p^{18}f^{15}$ c) $20h^{16}b^{11}$

5:     a) 1 b) 1

6:     a) 2 b) $\frac{1}{8}$

7:     a) $6\sqrt{7}$ b) $\sqrt{6}$

8:     $\dfrac{9\sqrt{10}}{10}$

9:     $41 - 12\sqrt{5}$

10:     a) $x > -7$ b) $x \le -10$

11:     a) $-1 \le x \le 1$ b) $x \le -4$ or $x \ge 4$

12:     a) $y = -3x + 4$ b) $y = -\frac{1}{4}x + 2$ c) $y = 1$ d) $y = x$

13:     a) Gradient = -3
        Mid-point = $(8.5, 6.5)$
        Length = $\sqrt{10}$
        b) Gradient = $-\frac{4}{3}$
        Mid-point = $(5.5, 8)$
        Length = $\sqrt{25} = 5$

14:     $8t^2 - 38t + 9$

15:     a) $j = -10$ b) $n = -9$, $n = 9$

16:     $(y - 8)(2y + 1)$

17:     $q = -3\frac{1}{2} \pm \frac{1}{2}\sqrt{61}$

18:     $v = -5$ and $k = 10$
        $v = -1$ and $k = 6$

19:     a) $\dfrac{a + 1}{a + 2}$ b) $\dfrac{2(r - 4)}{5}$

20:     a) $\dfrac{m - 1}{9} + \dfrac{3m + 9}{9} = \dfrac{4m + 8}{9} = \dfrac{4(m + 2)}{9}$ b) $\dfrac{7w + 28}{10} - \dfrac{6w - 12}{10} = \dfrac{w + 40}{10}$

21:     a) $\dfrac{7}{8z} \times \dfrac{2z}{5} = \dfrac{14z}{40z} = \dfrac{7}{20}$ b) $\dfrac{3c}{10} \times \dfrac{8}{9c} = \dfrac{24c}{90c} = \dfrac{4}{15}$