Kilsyth Academy

National 5 Maths

Homework

Booklet Number

National 5 Homework

Exercise 1 Brackets

*Section A (Non-calculator)*

1. Evaluate –

 a) 80% of 750g

 b) 3∙09 x 100

 c) 1∙757 ÷ 7

 d) −13 + 8

 e) 6 – 9

 f) −5 + (−11)

*Section B*

2. Remove the brackets –

 a) 3(*x* + 5) b) 4(*y* – 3) c) 6(2*p* + 3)

d) *x*(*y* – *x*) e) –3(*x* + 2) f) –2(*m* – 7)

1. Multiply out and then simplify –

 a) 3(*x* – 2) + 5*x* b) 6 – 2(*p* + 5)

1. Multiply out –

 a) (*x* + 1)(*x* + 2) b) (*y* – 3)(*y* – 1) c) (*n* – 4)(*n* + 2)

 d) (2*h* + 5)(3*h* + 2) e) (2*p* – 3)(5*p* – 1) f) (*z* + 3)2

5 Multiply out –

 a) (*x* + 2)(*x*2 + 5*x* − 3) b) (*y* – 3)(*y* – 1)(*y* + 4)

*Section C (Mixed)*

6 Evaluate: *xy* – *z*2 where *x* = 4, *y* = 5 and *z* = –2

7. For the year 2011, a Clothing company reported a profit of

 2∙7 million pounds. Write this profit in standard form. (scientific notation)

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Exercise 2 Factorising

*Section A (Non-calculator)*

1 Evaluate –

 a) *x*2 + *y*2 when *x* = −2, *y* = 4 and *z* = 10 b) 0∙05 × 60

 *z*

 c) 75% of £140 d) 47 × 19

*Section B (Knowledge)*

**Only use your calculator if you need to!**

2 Write down all the factors of:

a) 16 b) 12*x* c) 6*x*2

3 Factorise, where possible:

 a) 5*h* – 25 b) 8 – 8*x* c) *y*2 + 3*y*

 d) 2*p* + 4*q* + 6*r* e) 18*t* – 12*tr* f) 3*x* – 2*y*

4 Factorise:

 a) *p*2 – *q*2 b) *y*2 – 1 c) *h*2 – 25*t*2 d) 2*a*2 – 8

5 Factorise:

 a) *x*2 + 5*x* + 6 b) *y*2 – 6*y* + 8 c) *p*2 – *p* – 6

 d) *x*2 + 2*x* – 3 e) *f*2 – 20*f* + 36 f) 6*x*2 + 19*x* + 10

 g) 4*g*2 – *g* – 5 h) 3*t*2 + *t* – 4 i) 8*x*2 – 14*x* + 3

*Section C (Revision)*

6 The opening of a fireplace, shown in the diagram below, consists of a rectangle and a semi-circle.

45 cm

A metal strip is to be placed around the fireplace opening.

 Calculate the length of the metal strip.

31 cm

7 Solve these equations –

 a) 4*x* – 8 = 2(*x* + 6) b) 8(*x* + 1) + 3(6 – *x*) = 4(*x* + 10)

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Exercise 3 Volume

*Section A (Non-calculator)*

1 Work out – a) 36 x 14

 b) 30% of £190

 c) − 18 + 11

 d) 1∙254 ÷ 6

*Section B (Knowledge)*

**Only use your calculator if you need to!**

2 Work out the volume of the shapes shown below.

 Round your answers to 3 significant figures.

 a) Cylinder b) Sphere c) Cone

6 cm

8 cm

17 cm

8.7 cm

 2.7m

3 A soft drinks company designs a can of

 3.5cm

 juice in the shape of a cylinder as shown.

*h* = ?

 The can has radius 3.5 cm and contains

 260 cm3 of juice when full.

 Work out the height (*h*) of the can.

*Section C (Revision)*

1. Multiply out the brackets:

(a) (*x* + 6)(*x* + 2) (b) (*a* − 3)(*a* − 1)

5 Solve –

(a) 7(x − 8) = 14 (b) 3(2y + 5) = 3

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Exercise 4 Arcs and Sectors

*Section A (Non-calculator)*

1 Work out – a) 26 × 17

 b) 40% of £70

 c) 4∙3 + 7∙2 − 5∙36

 d) 1∙278 ÷ 6

**Only use your calculator if you need to!**

*Section B (Knowledge)*

2 Work out the arc length:

 a) b)

5∙6 m

245˚

87˚

8 cm

3 Work out the area of the sector:

 a) b)

 261˚

91˚

27 cm

13 mm

*Section C (Mixed)*

4 Write in the form (x ± a)2 ­± b (completing the square)

1. x2 + 6x b) d2 – 4d + 9 c) q2 + 10q – 4

5 The diagram below shows a triangular flag which is 28 centimetres across and 36 centimetres long.

28 cm

36 cm

 Calculate the area of the flag.

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Exercise 5 Gradients

*Section A (Non-calculator)*

1 Calculate: a)  b) 

*Section B (Knowledge)*

2 Chris and Nairo are cycling up 2 different hills.

 Chris’ hill has a gradient of 0.11.

 Nairo’s hill is shown in the diagram.

14km

1.23km

 Chris claims that his hill is steepest. Is he correct? *Give a reason.*

3 Calculate the gradient of the line joining points:

(a) $\left(2, 4\right)$ to $\left(5, 13\right)$ (b) $\left(10, 1\right)$ to $\left(1, 10\right)$ (c) $\left(-2, 0\right)$ to $\left(-6, -1\right)$

(d) $\left(0, -5\right)$ to $\left(6, -29\right)$ (e) $\left(4, 3\right)$ to $\left(-3, 3\right)$ (f) $\left(-3, 6\right)$ to $\left(-3, 9\right)$

4 The points $A\left(-3, 0\right)$, $B\left(-2, -4\right)$, $C\left(3,-2\right)$ and $D\left(2, 2\right)$ are the vertices of a quadrilateral.

 Show that this is a parallelogram.

*Section C (Mixed)*

4 Multiply out the brackets and simplify:

1. $(x + 7)(2x – 5)$ b) $(x + 3)(x^{2} – 4x – 9)$

5 Solve the equations -

 a) $3t + 18 = t + 26$ b) $9m + 8 = 5m - 12$

6 Factorise:

 a) $7x + 42$ b) $a^{2}– 49$ c) $x^{2} – 2x – 15$

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Exercise 6 Straight Line

*Section A (Non-calculator)*

1 Work out – a) 70% of £280 b) 1∙845 ÷ 9

 c)  d) 6 × 23

*Section B (Knowledge)*

2. Write down the gradient and *y* intercept of the line with equation:

a) *y* = −*x* + 3 b) 2*y* + 4*x* = 10

3. Write down the **equation of the line** which has gradient of –2 and passes through the y-axis at the point (0 , 5).

4. Write down the **equation of the line** joining point A( 8, 2) to point B(-1, 8).

5. Find the equation of the line passing through the points:

a) (8 , 7) and (6 , 1) b) (-2 , 2) and ( 4 , 12)

c) (0 , -2) and (1 , 1) d) (-3 , -6) and (1, -8)

e) (3 , 3) and (10 , 2) f) (-2 , 5) and (-7 , 5)

*Section C (Mixed)*

6. Work out *x* and *y*

42°

9 cm

*x*

 *y*°

 6 mm

15 mm

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Exercise 7 Equations and Inequalities

*Section A (Non-calculator)*

1 Evaluate –

 a) 13 + 4 × 2∙5 b) -18 + 43

c) 20% of £315 d) 0·042 × 60

e)  e) 

*Section B (Knowledge)*

2 Solve:

 a) 3*x* – 2 = 19 b) 5*y* + 4 = 19

c) 8*f* + 31 = 15 d) 4*p* + 8 = −28

e) 3(*h* – 2) = 15 f) 2(*m* + 16) = 26

3 Solve:

 a) 5*x* + 7 = 3x + 12 b) 3*y* − 9 = *y* + 5

c) 4(2*x* – 5) − 3*x* = 30 d) 2(7*y* – 3) – 5( 2*y* – 3) = 3

4 A rectangle 6 cm long and (2*x* + 1) cm broad has an area of 42cm2.

Make an equation, solve it for *x* and find the breadth of the rectangle.

5 Solve:

 a) 4*x* + 5 < 17 b) 2(*y* – 3) ≥ 14

c) 7*n* – 5 > 2*n* + 30 d) 2*h* – 9 ≤ 3 − *h*

e) 3*x* – 2(5*x* + 1) < 4(1 – *x*)

*Section C (Mixed)*

6 Calculate the circumference of the circles:

HINT: C = πd

 a) b)

9 cm

7 m

7 Calculate the area of the circles:

HINT: A = πr2

 a) b)

4.8 m

12 cm

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Exercise 8 Surds and Indices

*Section A (Non-calculator)*

1. Evaluate –

 a) 80% of 650g b) 3∙09 × 400

 c) 2∙765 ÷ 7 d) 4*y* – 19*y* + 7*y*

*Section B (Knowledge)*

1. Simplify these surds:
2.  b)  c)  d) 
3. Rationalise the denominator: 
4. Simplify:
5.  b)  c)  d) 

 e)  f)  g)  h) 

1. Evaluate:
2.  b) 

6 A grain of sand weighs approximately 3.1 x 10-4 grammes.

 A bag of sand weighs 1kg.

 Calculate the number of grains of sand in the bag.

 *Write your answer in scientific notation.*

*Section C (Mixed)*

7 A tin of paint is designed in the shape of a cylinder with diameter 18 cm and height *h* cm as shown.

*h* cm

 The tin contains 2.5 litres of paint.

 Work out the height, *h* cm, of the tin.

16 cm

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Exercise 9 Algebraic Fractions

*Section A (Non-calculator)*

1. Evaluate –

 a) 90% of £24 b) 25 – 4∙9 ÷ 7

 c) *x*2 +  where *x* = −6 and *y* = −2 d) 78 × 59

2. Break the brackets: ( *x* – 4 )( 3*x* + 7 )

3. Work out –

 a)  b)  c)  d) 

*Section B (Knowledge)*

4. Simplify the following algebraic fractions:

(a)  (b)  (c) 

5. Factorise the numerator and/or the denominator, then simplify:

(a)  (b)  (c) 

6. Express each of the following as a single fraction and simplify where possible:

(a)  (b)  (c) (d) 

*Section C (Mixed)*

7. This shape consists of a cone, a cylinder and a hemisphere.
Calculate its total volume.

30 cm

18cm

12 cm

