Name: ..... Maths Class: .....

SYDNEY TECHNICAL HIGH SCHOOL

Year 8

Mathematics

Common Test

Half Yearly

May, 2016 7

Time allowed: 70 minutes

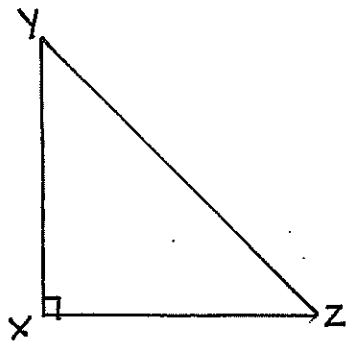
General Instructions:

- Marks for each question are indicated on the question.
- Approved calculators may be used
- All necessary working should be shown
- Full marks may not be awarded for careless work or illegible writing
- Write using black or blue pen
- Write your answers in the space provided

Question 1	/16
Question 2	/15
Question 3	/15
Question 4	/15
Question 5	/15
TOTAL	/76

Question 1. PYTHAGORAS (16 marks)

Marks

1. 

1

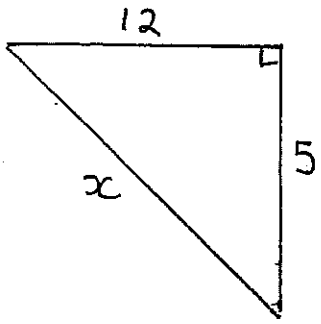
Name the hypotenuse

_____

---

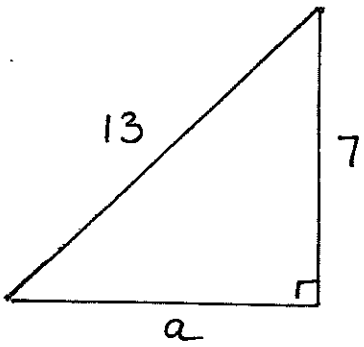
2. Find the value of x

2



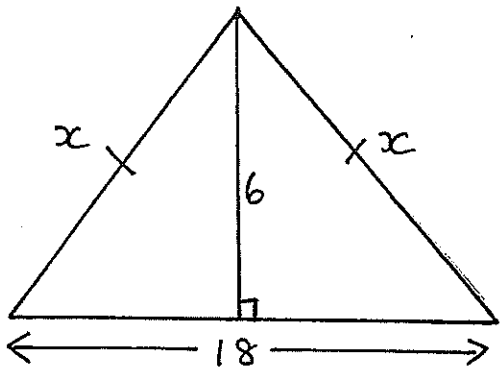
3.

2



Find a and leave your answer in exact form

4. 1



For this diagram which statement is correct.

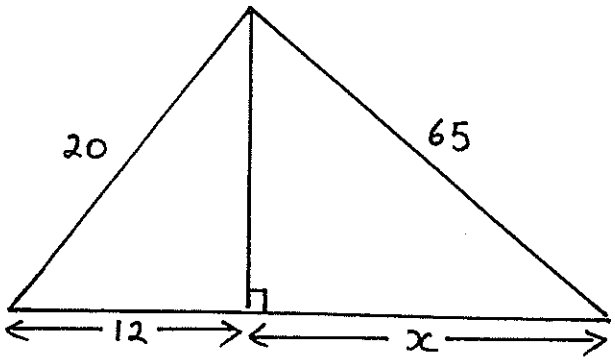
A. $x^2 + x^2 = 18^2$

B. $6^2 + 9^2 = x^2$

C. $6^2 + x^2 = 18^2$

D. $x^2 + 6^2 = 9^2$

5. Find the value of the pronumeral 3



6. Two brothers, Rodney and Richard left home at 8am. Rodney drove due north at 50km/hr while Richard drove due east at 80km/hr.

a) How far has each person travelled by 10.30am? 1

b) Find the distance between the brothers at 10.30am correct to the nearest km. 2

7. Do 7, 24 and 26 form a Pythagorean Triad? Show reasoning for your answer. 2

---

8. A broomstick leans against a wall. The stick is 1.5m long and reaches 1.2m up the wall. How far from the base of the wall is the bottom of the broom? 2

Question 2. PERCENTAGES (15 marks)

Marks

1. Find $5\frac{1}{7}\%$ of \$55 — 1

2. In a group of 500 people, 22% are left handed. How many of the group are right handed? — 1

3. Increase \$240 by 15% — 1

4. Matt buys a car for \$2800 and sells it for \$4200. What is his percentage profit? — 1

5. What percentage is 240g of 1.5kg? — 1

6. A fridge was given a 35% discount and the final price was \$455. What was the price before the discount? — 2

Marks

7. A woman has a part time job selling home products door to door. She is paid a weekly retainer of $180 plus a commission of 16% on the value of her sales. Find her total pay for a week in which her sales totalled $1700. 2

---

8. John invests $1000 in a share plan. It makes 20% in the first year but loses 18% in the second year. How much is John's investment worth after 2 years. 1

---

9. In a school 30 boys and 20 girls are entered in a competition. Prizes were awarded to 10% of the boys and 20% of the girls. Find the total percentage of entrants receiving prizes. 2

---

10. The sale price of a cricket bat including 10% GST is $253. Find the cost of the bat excluding GST.

2

---

11. Find the simple interest on $500 at 3.5% p.a for 15 months. 1

Question 3. ALGEBRA (15 marks)

Marks

1. Simplify 2

a) $12m - 2n + 6m - 4n$ _____

b) $3gh \div 6g$ _____

---

2. Expand and simplify 4

a) $12 + 7(x - 4)$ _____

_____

b) $9(2x + 4) - 3(2 - 4x)$ _____

_____

---

3. Fully factorise $6a^2y - 3ay^3$ _____ 1

---

4. Simplify 4

a) $\frac{4x}{5} + \frac{x}{3}$

---

b) $\frac{20a}{14c} \div \frac{4ab}{7c}$

---

5. Simplify 4

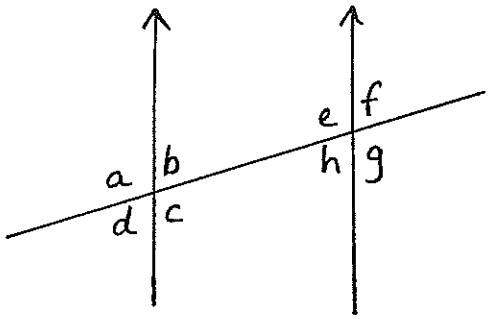
a) $(2p^3)^3$ _____ b) $x^2y^4 \div xy^3$ _____

c) $3x^0 + (4y)^0$ _____ d) $4bc^6 \times 3b^3 \times 5c^2$ _____

Question 4. GEOMETRY (15 marks)

Marks

1.



From the diagram, name the angle that is

a) co-interior to angle b _____ 1

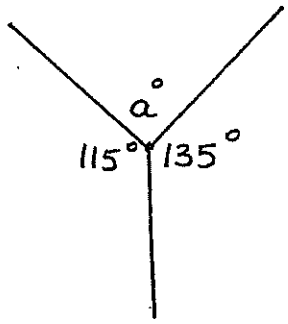
b) corresponding to angle a _____ 1

c) alternate to angle e _____ 1

---

2. Find the values of the pronumeral. Give reasons for each of your answers.

a)



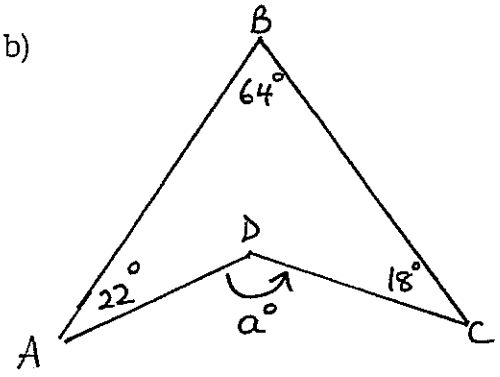
2

a° = _____

Reason =

---

b)



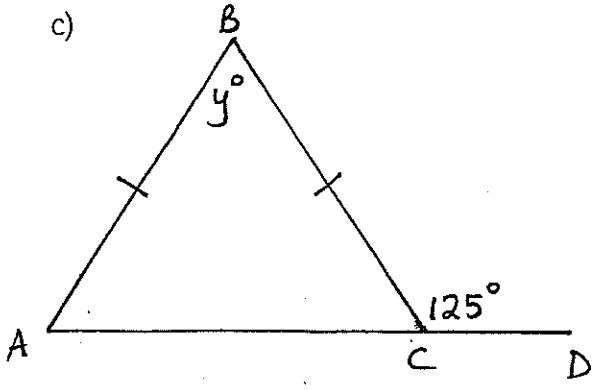
2

a° = _____

Reasons =

---

c)



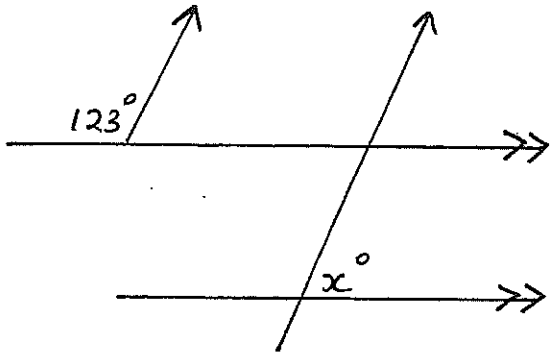
2

y° = _____

Reasons =

Marks

3. 1



$x =$ _____

Reasons not required

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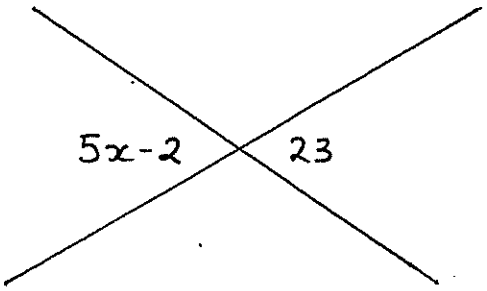
4. 2

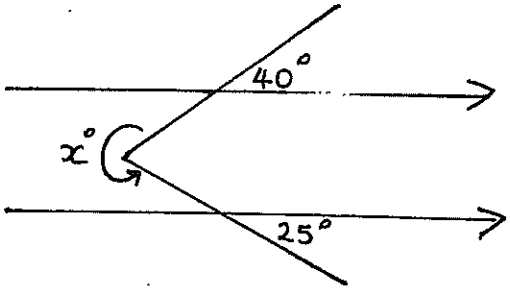


$x° =$ _____

Reason =

---

5. 1

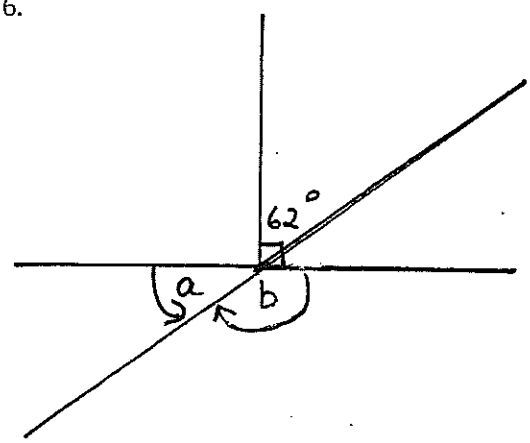


$x° =$ _____

Reasons not required

---

6. 2



$a° =$ _____

$b° =$ _____

Reasons not required

Question 5. MISCELLANEOUS (10 marks)

Marks

1. If $f(x) = 2x - 1$ and $g(x) = x^2 + 2$ find 3

   a) $f(-1)$ _____

   b) $g(-1)$ _____

   c) $f(a) + g(a)$ _____

   _____

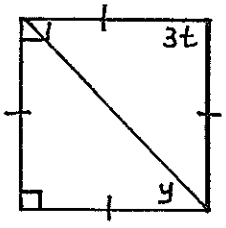
2. Simplify $\dfrac{4x^4 \times 3x^2y^3}{6x^3y^2 \times 4xy}$ 2

3. Which is the least expensive sauce: Soy at \$1.45 for 200ml, Barbeque at \$2.30 for 250ml, Worcestershire at \$2.25 for 300ml or Tomato sauce at \$1.80 for 750ml. Show reasoning. 2

4. A rectangular prism measures 6cm wide, 20cm long and 5cm high. Find the length of the longest pencil that can fit into the box, leaving your answer correct to 2 decimal places. 3

Marks

5.



$t =$ _____ 1

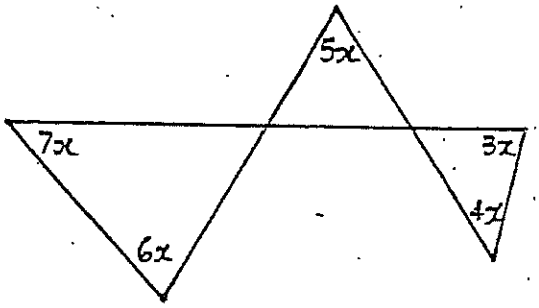
Reason = 1

$y =$ _____ 1

Reason 1

---

6. 1



$x =$ _____

No reasons required

Name: SOLUTIONS. Maths Class: .....

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Question 4	/15
Question 5	/15
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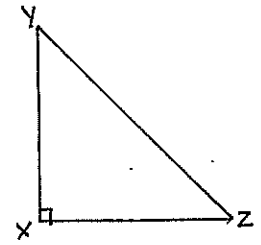
Question 1. PYTHAGORAS (16 marks)

Marks

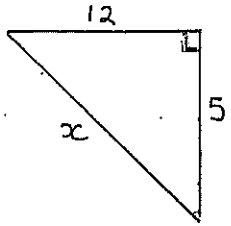
1. 

Name the hypotenuse — 1

YZ

---

2. Find the value of x — 2



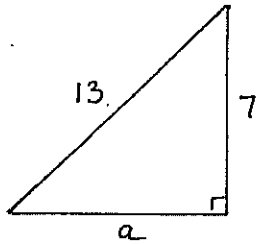
$x^2 = 12^2 + 5^2$

$x^2 = 169$

$x = 13$

---

3. — 2



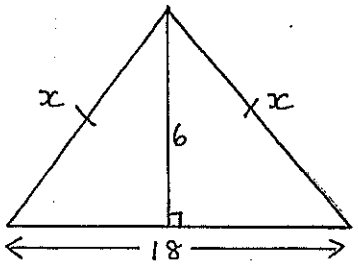
Find a and leave your answer in exact form

$a^2 = 13^2 - 7^2$

$a^2 = 120$

$a = \sqrt{120}$

4. 1



For this diagram which statement is correct.

A. $x^2 + x^2 = 18^2$

B. $6^2 + 9^2 = x^2$

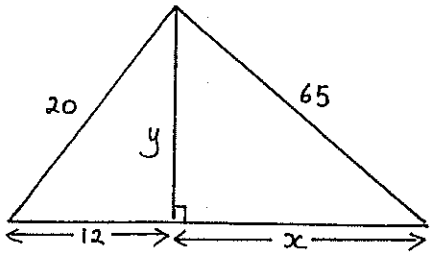
C. $6^2 + x^2 = 18^2$

D. $x^2 + 6^2 = 9^2$

B

---

5. Find the value of the pronumeral 3



$y^2 = 20^2 - 12^2$

$y^2 = 256$

$y = 16$

$x^2 = 65^2 - 16^2$

$x^2 = 3969$

$x = 63$

---

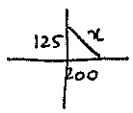
6. Two brothers, Rodney and Richard left home at 8am. Rodney drove due north at 50km/hr while Richard drove due east at 80km/hr.

a) How far has each person travelled by 10.30am? 1

Rodney = $50 \times 2\frac{1}{2} = 125$km

Richard = $80 \times 2\frac{1}{2} = 200$km

b) Find the distance between the brothers at 10.30am correct to the nearest km.



$x^2 = 125^2 + 200^2$

$x^2 = 55625$

$x = \sqrt{55625} = 235.8495$ 2

∴ Distance b/w 2 brothers 236km

---

7. Do 7, 24 and 26 form a Pythagorean Triad? Show reasoning for your answer. 2

To be Pyth Triad $26^2 = 7^2 + 24^2$

$676 = 49 + 576$

$676 \neq 625$

∴ Not a Pythagorean Triad

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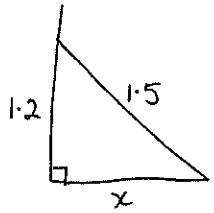
8. A broomstick leans against a wall. The stick is 1.5m long and reaches 1.2m up the wall. How far from the base of the wall is the bottom of the broom? 2



$x^2 = 1.5^2 - 1.2^2$

$x^2 = 0.81$

$x = 0.9$m

Question 2. PERCENTAGES (15 marks)

Marks

1. Find $5\frac{1}{7}\%$ of \$55 — 1

\$2.83

2. In a group of 500 people, 22% are left handed. How many of the group are right handed? — 1

78% × 500 = 390 right handed

3. Increase \$240 by 15% — 1

115% × 240

= \$276

4. Matt buys a car for \$2800 and sells it for \$4200. What is his percentage profit? — 1

% profit = $\frac{1400}{2800} \times 100$

= 50%

5. What percentage is 240g of 1.5kg? — 1

= $\frac{240}{1500} \times 100$

= 16%.

6. A fridge was given a 35% discount and the final price was \$455. What was the price before the discount? — 2

$\frac{65}{100} x = 455$

$x = \$700$

Marks

7. A woman has a part time job selling home products door to door. She is paid a weekly retainer of \$180 plus a commission of 16% on the value of her sales. Find her total pay for a week in which her sales totalled \$1700. — 2

Pay = $180 + \frac{16}{100} \times 1700$

= \$452

8. John invests \$1000 in a share plan. It makes 20% in the first year but loses 18% in the second year. How much is John's investment worth after 2 years. — 1

120% × 1000

= \$1200

82% × 1200

= \$984 after 2 yrs

9. In a school 30 boys and 20 girls are entered in a competition. Prizes were awarded to 10% of the boys and 20% of the girls. Find the total percentage of entrants receiving prizes. — 2

Boys = 10% × 30

= 3

Girls = 20% × 20

= 4

Total % = $\frac{7}{50} \times 100$

= 14%

10. The sale price of a cricket bat including 10% GST is \$253. Find the cost of the bat excluding GST. — 2

110% × x = 253

$x = \$230$

11. Find the simple interest on \$500 at 3.5% p.a for 15 months. — 1

$SI = \frac{3.5}{100} \times 500 \times 1\frac{1}{4}$

= \$21.88

Question 3. ALGEBRA (15 marks)

Marks

1. Simplify 2

a) $12m - 2n + 6m - 4n$ $18m-6n$

b) $3gh \div 6g$ $\frac{3gh}{6g} = \frac{h}{2}$

2. Expand and simplify 4

a) $12 + 7(x - 4)$ $12+7x-28$ $7x-16$

b) $9(2x + 4) - 3(2 - 4x)$ $18x+36-6+12x$ $30x+30$

3. Fully factorise $6a^2y - 3ay^3$ $3ay(2a-y^2)$ 1

4. Simplify 4

a) $\frac{4x}{5} + \frac{x}{3} = \frac{12x+5x}{15} = \frac{17x}{15}$

b) $\frac{20a}{14c} \div \frac{4ab}{7c} = \frac{20a}{14c} \times \frac{7c}{4ab} = \frac{5}{2b}$

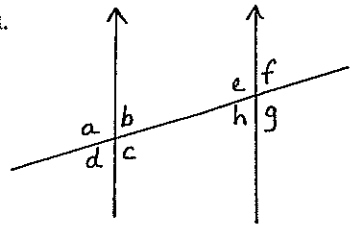
5. Simplify 4

a) $(2p^3)^3$ $8p^9$ b) $x^2y^4 \div xy^3$ xy

c) $3x^0 + (4y)^0$ $3+1=4$ d) $4bc^6 \times 3b^3 \times 5c^2$ $60b^4c^8$

Question 4. GEOMETRY (15 marks)

Marks

1. 

From the diagram, name the angle that is

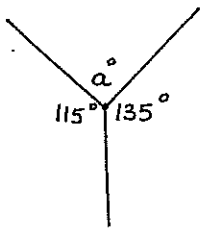
a) co-interior to angle b e 1

b) corresponding to angle a e 1

c) alternate to angle e c 1

2. Find the values of the pronumeral. Give reasons for each of your answers.

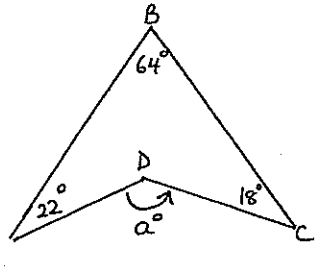
a) 2



$a^\circ = 110^\circ$

Reason = angles at a point add to 360°

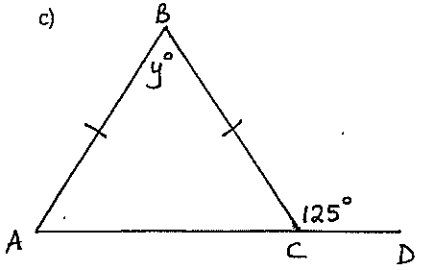
b) 2



$a^\circ = 104^\circ$

Reasons = angle sum of quadrilateral and angles at a point

c) 2



$y^\circ = 70^\circ$

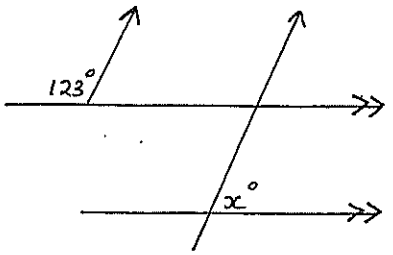
Reasons =

$\angle BCA = 55$ (angle sum of straight line)

$\angle BAC = 55$ (equal angles of isosceles triangles)

$y = 70$ angle sum of triangle

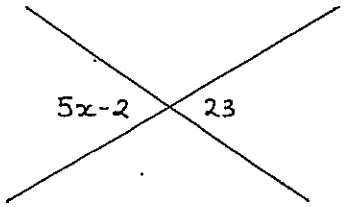
Marks

3. 

1

$x =$ 57

Reasons not required

4. 

2

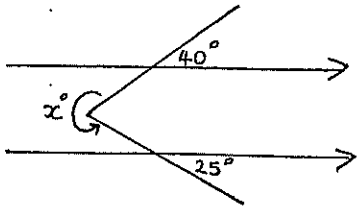
$5x-2=23$

$5x=25$

$x° =$ 5

Reason =

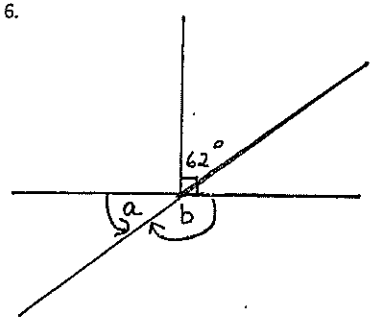
vertically opposite angles equal

5. 

1

$x° =$ 295

Reasons not required

6. 

2

$a° =$ 152

$b° =$ 28

Reasons not required

Question 5. MISCELLANEOUS (10 marks)

Marks

1. If $f(x) = 2x - 1$ and $g(x) = x^2 + 2$ find 3

a) $f(-1)$ $2(-1)-1 = -3$

b) $g(-1)$ $1+2=3$

c) $f(a) + g(a)$ $2a-1+a^2+2$

a^2+2a+1

2. Simplify $\frac{4x^4 \times 3x^2y^3}{6x^3y^2 \times 4xy}$ 2

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

$= x^3$

3. Which is the least expensive sauce: Soy at \$1.45 for 200ml, Barbeque at \$2.30 for 250ml, Worcestershire at \$2.25 for 300ml or Tomato sauce at \$1.80 for 750ml. Show reasoning. 2

Soy \$7.25/L

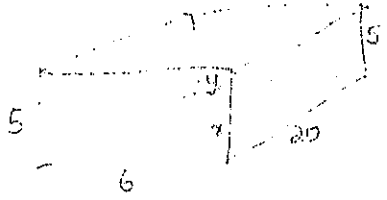
BBQ \$9.20/L

Wor \$7.50/L

Tom \$2.40/L

∴ Tomato Sauce

4. A rectangular prism measures 6cm wide, 20cm long and 5cm high. Find the length of the longest pencil that can fit into the box, leaving your answer correct to 2 decimal places. 3



Let y be pencil

$x^2 = 6^2 + 20^2$

$x^2 = 436$

$x = \sqrt{436}$

$x = 20.88$

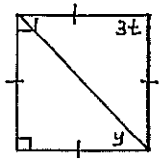
$y^2 = 5^2 + 20.88^2$

$y^2 = 460.9744$

$y = 21.47$

Marks

5.



$3t = 90$

$t =$ 30 — 1

Reason = 90° angle of square — 1

$y =$ 45 — 1

Reason equal angle of isosceles triangle — 1

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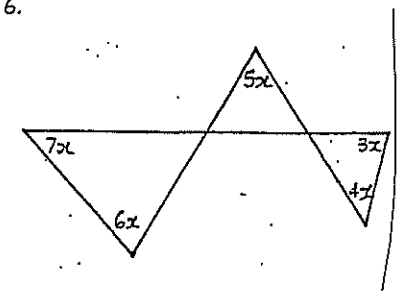
6. — 1



$x =$ 12

No reasons required

$5x + 180 - 13x + 180 - 7x = 180$

$360 - 15x = 180$

$-15x = -180$

$x = 12$