**Foundations of Mathematics 11** Name: Key

**Chp. 1/2 Test – Inductive/Deductive Reasoning & Angle Properties** April 2018

**FORMULA…** $S(n) = 180°(n - 2)$

**Multiple Choice (15 Marks)** 14

***Circle the letter corresponding to the correct solution.***

1. Ronald made the following conjecture: 'The difference between two numbers always lies between the two numbers.' Is the following equation a **counterexample** to this conjecture? Explain.

$$8 - (-3) = 11$$

A) No, it is not a counterexample, because 8 lies between –3 and 11.
B) No, it is not a counterexample, because 8 is greater than –3 and 11.
C) Yes, it is a counterexample, because 8 lies between –3 and 11.
D) Yes, it is a counterexample, because 8 is greater than –3 and 11.

A D

OMIT

2. Which of the following choices, if any, uses **deductive** reasoning to show that an odd number and an even number sum to an odd number?

B A) $2x + 2y + 1 = 2(x + y + 1)$
C) $3 + 6 = 9$ and $4 + 5 = 9$
(B) $(2x + 1) + 2y = 2(x + y) + 1$
D) None of these

3. Determine the unknown term in this pattern: 2, 6, 18, 54, ____, 486, 1458 ← typo

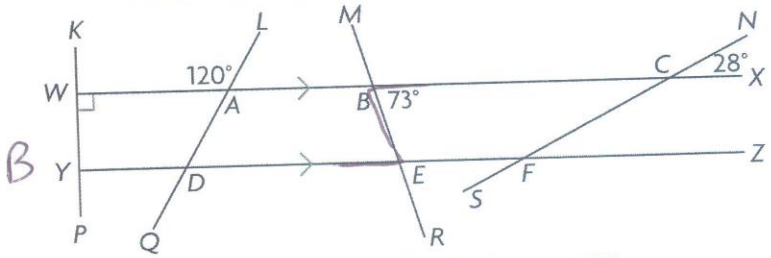
54 x 3

C A) 216 B) 196 (C) 162 D) 108

4. Which of the following conjectures has a **converse that is TRUE**?

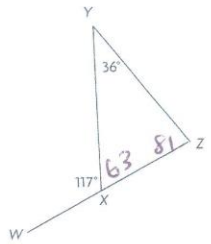
B A) If $x = 9$, then $x^2 = 81$
(B) If a triangle is equilateral, then all angles in the triangle are 60°
C) If it is raining outside, then the grass is wet.
D) If a quadrilateral is a square, then there are 4 equal sides

5. Which angle property proves $\angle BED = 73°$?




B A) corresponding angles
(B) alternate interior angles
C) co-interior angles
D) supplementary angles

6. Which are the correct measures for $\angle YXZ$ and $\angle XZY$?




A) $\angle YXZ = 53°$, $\angle XZY = 91°$
B) $\angle YXZ = 53°$, $\angle XZY = 81°$
C) $\angle YXZ = 63°$, $\angle XZY = 91°$
D (D) $\angle YXZ = 63°$, $\angle XZY = 81°$

$2880 = 180(n-2)$
$2880 = 180n - 360$
$3240 = 180n$
$\frac{3240}{180} = \frac{180n}{180}$
$18 = n$

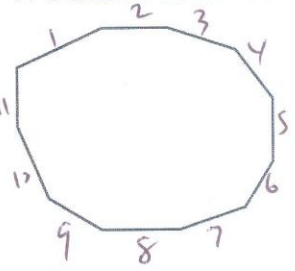
7. The sum of the interior angles of a convex polygon measures 2880°. How many sides does the polygon have?

C A) 16 B) 17 (C) 18 D) 19

8. With which of the following polygons could you create a tiling pattern?

A (A) a regular hexagon B) a regular octagon C) a regular pentagon D) none of the above

9. Determine the sum of the measures of the interior angles of this polygon.




C

A) 1080°

B) 1260°

C) 1620°

D) 1440°

$180(11-2)$

10. What type of error, if any, occurs in the following proof?

B

$$\begin{aligned} 2 &= 2 \\ 4(2) &= 4(1+1) \\ 4(2)+3 &= 4(1+1)+3 \\ 8+3 &= 6+3 \\ 11 &= 9 \end{aligned}$$

A) an error in reasoning

B) an error in calculation

C) a false assumption or generalization

D) there is no error in the proof

11. Which number should appear in the centre of Figure 4?

B

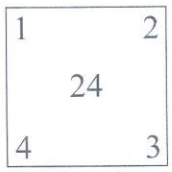


Figure 1

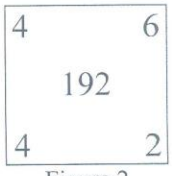


Figure 2

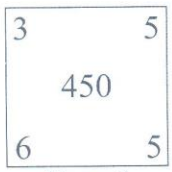


Figure 3

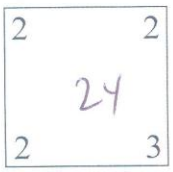


Figure 4

$2^{3\times3}$

A) 11 B) 24 C) 36 D) 41

12. Which conjecture, if any, could you make about the product of two odd integers?

$3\times3=9$

B

A) The product will be an even integer.

B) The product will be an odd integer.

C) The product will be negative.

D) It is not possible to make a conjecture.

$5\times11=55$

$-7\times9=-63$

13. Paul works at a bicycle store in Miramichi. For the start of spring, the manager of the store has ordered 50 mountain bikes and 10 racing bikes. Which conjecture is Paul most likely to make from this evidence?

D

A) Either type of bike will sell equally well.

B) Racing bikes will likely sell better than mountain bikes.

C) It will rain all summer and no one will ride bicycles.

D) Mountain bikes will likely sell better than racing bikes.

14. Jackie made the following conjecture: 'The square of a number is always greater than the number.'

Which choice, if either, is a **counterexample** to this conjecture?

**Choice #1.** $0.5^2 = 0.25$

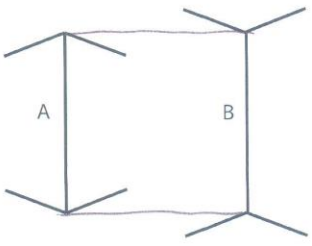
**Choice #2.** $(-5)^2 = 25$

A

A) Choice 1 only B) Choice 2 only C) Choice 1 and Choice 2 D) Neither Choice 1 nor Choice 2

15. Make a conjecture as to which line segment is longer, A or B.

C




A) I predict that A is longer than B.

B) I predict that B is longer than A.

C) I predict that A and B are the same length.

D) None of these

14

**Open Response (25 Marks)**
**Show all your work and clearly explain your solution.**

1. Janna made the following conjecture: 'Every odd number can be written as the sum of three consecutive integers.' Is her conjecture reasonable? **If YES, show using inductive reasoning. If NO, find a counterexample.** [2]

Circle: YES / (NO)

$-1+0+1=0$
$0+1+2=3$ ] what about 1?

(1) (1)

/2

2. Tony discovered a number trick in a book he was reading:

- Choose a Number
- Add 5
- Double the result
- Subtract 4
- Divide the result by 2
- Subtract the number you started with

Make a conjecture with **inductive reasoning** (3 times) and then prove it **deductively**. [7]

**Conjecture:** The result is always 3 (1)

| **Inductive Reasoning** | | | **Deductive Reasoning** |
|---|---|---|---|
| 11 | -5 | 20 | $x$ |
| 16 | 0 | 25 | $x+5$ (1) |
| 32 | 0 | 50 | $2(x+5)$ |
| 28 | -4 | 46 | $2x+10-4$ |
| 14 | -2 | 23 | $\frac{2x+6}{2}$ (1) |
| 3 | 3 | 3 | $x+3-x$ |
| (1) | (1) | (1) | $\boxed{3}$ (1) |

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3. Andrew, Bertha, Carla, and Dixon all live on the same street. One is a chef, one is a police officer, one is an editor, and one is a travel agent.
   - Dixon and Carla eat dinner with the editor.
   - Andrew and Bertha carpool with chef.
   - Carla watches soccer on television with the chef and the editor.

**Use the statements above to determine which person is the chef and state your reasoning.** [2]

**Chef →** Dixon (1)

**Reasoning…**

| | Chef | Police | Editor | Travel |
|---|---|---|---|---|
| A | X | | | |
| B | X | | | |
| C | X | | X | |
| D | ✓ | | X | |

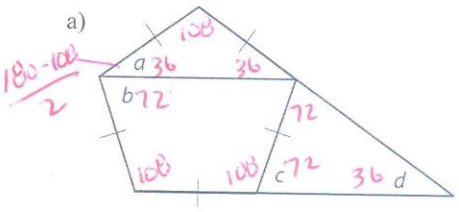
(1)

/2

/11

4. Determine the value of the unknowns in each of the following… [7]

a)




$180(5-2) = 108°$ / 5

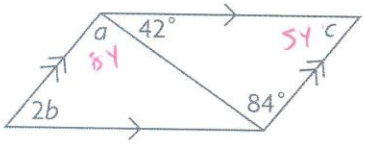
$180 - 108 = 72$ / 2

$a =$ 36 ① $b =$ 72° ①

$c =$ 72° ① $d =$ 36° ①

/1

b)




$a =$ 84° ①

$b =$ 27° ①

$c =$ 54° ①

$2b + 126 = 180$

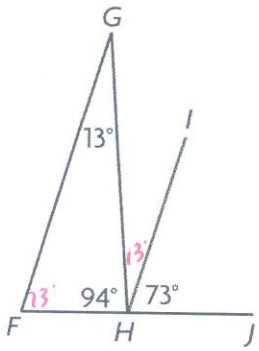
$2b = 180 - 126$

$\frac{2b}{4} = \frac{54}{2}$

$b = 27°$

5. Complete the following proof by providing statements and justifications.

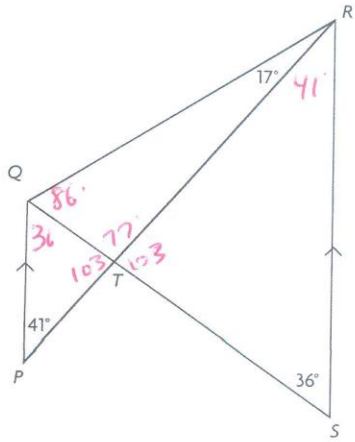
**PROVE:** $FG \parallel HI$ given the following diagram... [4]




| STATEMENT | JUSTICATION |
|---|---|
| $\angle FGH = 13°$ | Given ① |
| $\angle GHI = 13°$ | SAT ① |
| $\angle FGH \cong \angle GHI$ | Transitive ① |
| $\therefore GF \parallel HI$ | AIA ① |
| OR | |
| $\angle IHJ = 73°$ | Given |
| $\angle GFH = 73°$ | SATT |
| $\angle IHJ \cong \angle GFH$ | Transitive |
| $\therefore GF \parallel HI$ | CA |

/4

6. Determine the measure of $\angle RQS$. **State ALL other angles you find with <u>justifications</u> that lead to finding $\angle RQS$.** [3]




$\angle PRS = 41°$ (AIA) ①

$\angle RQS = 86°$ (SATT) ①

$\angle RQS =$ 86° ①

/3

/14