AP COMPUTER SCIENCE PRINCIPLES • EXERCISE SHEET

3.3 Mathematical Expressions

Name: _____ Class: _____ Date: _____ **Total: 9 marks**

Objective

Build the skills to answer exam questions on **mathematical expressions**.

You must be able to:

- evaluate an **arithmetic expression** 算术表达式
- apply the **order of operations** 运算顺序
- use the **modulus** 取模 operator (the remainder of integer division)
- reason about **integer** versus decimal results

1 Worked examples

Study these first. Each one shows the method for a question type used later.

> ■ **Arithmetic and order of operations**
> Use $+$, $-$, $\times$, $\div$. Do $\times$ and $\div$ **before** $+$ and $-$; brackets first: $(2+3)\times 4 = 20$.
>
> ■ **Modulus**
> `MOD` returns the **remainder** of integer division: $17 \bmod 5 = 2$ (since $17 = 3\times 5 + 2$).
>
> ■ **Integer vs decimal**
> Combining whole numbers may give a whole or a decimal result —keep track of which.

2 Practice

2.1 Evaluate $2 + 3 \times 4$. [2]

2.2 Find $17 \bmod 5$. [1]

2.3 State what the modulus operator returns. [1]

3 Exam-style questions

3.1 The modulus operator returns the [1]

- **A** quotient
- **B** remainder
- **C** sum
- **D** product

3.2 Using the order of operations, $10 - 2 \times 3$ equals [1]

- **A** 24
- **B** 4
- **C** 8
- **D** 6

3.3 Evaluate the following.

(a) $(6 + 4) \div 2$. [1]

(b) 20 mod 6. [1]

(c) State whether 20 mod 6 shows that 20 is a multiple of 6. [1]

4 Go further

- work through the **3.3 Mathematical Expressions** lesson on the **Learn** page;
- read the **Algorithms and Programming** section of the AP Computer Science Principles handout on the **Know** page.

Solutions

2.1 $\times$ first: $3 \times 4 = 12$, then $2 + 12 = 14$.

2.2 $17 \bmod 5 = 2$.

2.3 the remainder of an integer division.

3.1 B.

3.2 B —$2 \times 3 = 6$, then $10 - 6 = 4$.

3.3 (a) $10 \div 2 = 5$. (b) $20 \bmod 6 = 2$. (c) no —the remainder is 2, not 0, so 20 is not a multiple of 6.